

A world map with several regions highlighted in yellow, including North America, parts of Europe, China, and Australia. Small black dots are scattered across the map, representing data points or locations.

# Some Facts and Some Open Questions in the Study of Inequality

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## Some Facts: A Guided Tour

- 1 Inequality in Earnings and Household Income
- 2 An Overview of Growing Income Inequalities in OECD Countries
- 3 Wages at a Point in Time and Evolution of Distributions of Wages
- 4 Educational Responses to Rising Wage Differentials
- 5 Inequality in Wages, Earnings, and Income: International Trends
- 6 Labor Supply and Selection Bias
- 7 Additional Discussion of Taxes and Transfers
- 8 Consumption
- 9 Family as a Source of Inequality
- 10 Health Inequality
- 11 Inequality in Developing Countries

## 1. Household Level

- Single headed vs. married vs. cohabitation
- Family compensation vs reinforcement across siblings
- Transfers between the parent and the child, and vice versa
- Interhousehold transfers across extended families

## 2. Point in time vs. lifecycle

- Wage and price dynamics
- Dynamics of attribute or capability formation (investment dynamics including identity formation).
- Consumption: thought to be a better measure of welfare (long run) but this depends on market structure.

## Dimensions of Inequality

### 3. At Individual Level:

- Wages (prices of attributes)
- Attributes (“human capital”. Broader notion: **capabilities**)
- Functionings
- Capital income and wealth
- Consumption vs. current flow of income
- Transfer income (taxes)
- Health



## 4. Intergenerational transmission

- Genetics
- Environmental contributions
  - 4.1 Parental
  - 4.2 Peers
  - 4.3 Other social influences

We consider both measurement and modeling issues.

## The Two Faces of Inequality

1. Arises as a market signal (“good” inequality)
2. May also arise from discrimination and denial of opportunity (“bad” inequality).

## **Theme That Runs Throughout These Lectures: Capabilities (Sen, 1986)**

- The capacity to flourish and perform a variety of tasks of life
- Individual traits and capacities (ability, personality)
- Institutional contributions to flourishing (Restrictions/ contributions)
- Sen and Nussbaum broaden this concept considerably to political inclusion, freedom of press, political liberties.
- Will not go so far

## Modeling Human Capability Formation

- An agent at age  $t$  is characterized by a vector of capabilities

$$\theta_t = (\theta_t^C, \theta_t^S, \theta_t^H),$$

where

- $\theta_t^C$  is a vector of cognitive abilities (e.g., IQ) at age  $t$ ,
  - $\theta_t^S$  is a vector of personality/socioemotional abilities at age  $t$  (e.g., patience, self control, temperament, risk aversion, and neuroticism)
  - $\theta_t^H$  is a vector of health stocks for mental and physical health at age  $t$ .
- Capabilities joined with incentives and social environments create outcomes.

1.

## Some facts on Inequality in Household Income, Earnings and Consumption

## Sources of Income: Some Definitions

**Individual Income measurement:** For each person in the sample 15 years old and over, the CPS asks questions on the amount of money income received in the preceding calendar year from each of the following sources:

- **Earnings**
- Unemployment compensation
- Workers' compensation
- Social security
- Supplemental security income
- Public assistance
- Veterans' payments
- Survivor benefits
- Disability benefits
- Pension or retirement income
- Interest
- Dividends
- Rents, royalties, and estates and trusts
- Educational assistance
- Alimony
- Child support
- Financial assistance from outside of the household
- Other income

Source: Current Population Survey (CPS)

**Earnings.** The Census Bureau classifies earnings from longest job (or self-employment) and other employment earnings into three types:

- **Money wage or salary income** is the total income people receive for work performed as an employee during the income year. This category includes wages, salary, armed forces pay, commissions, tips, piece-rate payments, and cash bonuses earned, before deductions are made for items such as taxes, bonds, pensions, and union dues.
- **Net income from nonfarm self-employment** is the net money income (gross receipts minus expenses) from one's own business, professional enterprise, or partnership. Gross receipts include the value of all goods sold and services rendered. Expenses include items such as costs of goods purchased, rent, heat, power, depreciation charges, wages and salaries paid, and business taxes (not personal income taxes). In general, the Census Bureau considers inventory changes in determining net income from nonfarm self-employment; replies based on income tax returns or other official records do reflect inventory changes. However, when respondents do not report values of inventory changes, interviewers will accept net income figures exclusive of inventory changes. The Census Bureau does not include the value of saleable merchandise consumed by the proprietors of retail stores as part of net income.

Source: Current Population Survey (CPS)



- **Net income from farm self-employment** is the net money income (gross receipts minus operating expenses) from the operation of a farm by a person on their own account, as an owner, renter, or sharecropper. Gross receipts include the value of all products sold, payments from government farm programs, money received from the rental of farm equipment to others, rent received from farm property if payment is made based on a percent of crops produced, and incidental receipts from the sale of items such as wood, sand, and gravel. Operating expenses include items such as cost of feed, fertilizer, seed, and other farming supplies; cash wages paid to farmhands; depreciation charges; cash rent; interest on farm mortgages; farm building repairs; and farm taxes (not state and federal personal income taxes). The Census Bureau does not include the value of fuel, food, or other farm products used for family living as part of net income. In determining farm self-employment income, the Census Bureau considers inventory changes in determining net income only when they are accounted for in replies based on income tax returns or other official records which reflect inventory changes; otherwise, the Census Bureau does not take inventory changes into account.

Source: Current Population Survey (CPS)

**Household Income:** Includes individual income of the householder and all other people 15 years and older in the household, whether or not they are related to the householder.

**CBO adjustment to Household Income:**

1. Inflation - using the Bureau of Labor Statistics' research series of the consumer price index for all urban consumers (CPI-U-RS).
2. Differences in household size-specifically, by dividing income by the square root of a households size.

Source: CBO

CBO study assesses the effects of transfers and taxes on the **distribution of household income** by examining the differences in the dispersion of income for three types of income:

- **Household Market income** (before-transfer, before-tax income)
- **Household Market income plus government transfers** (after-transfer, before-tax income)
- **Household Market income plus government transfers minus federal taxes** (after-transfer, after-federal-tax income) called after-tax income in this study.

Source: CBO

**Household Market income** includes the following components:

- **Labor income** - includes cash wages and salaries, employer-paid health insurance premiums, and the employer's share of Social Security, Medicare, and federal unemployment insurance payroll taxes.
- **Business income** - includes net income from businesses and farms operated solely by their owners, partnership income, and income from S corporations.
- **Capital gains** - profits realized from the sale of assets. Increases in the value of assets that have not been realized through sales are not included in market income.
- **Capital income (excluding capital gains)** - comprises taxable and tax-exempt interest, dividends paid by corporations, positive rental income, and corporate income taxes. Capital gains are considered separately and not included in this measure of capital income. The Congressional Budget Office assumes in this analysis that corporate income taxes are borne by owners of capital in proportion to their income from capital; therefore, the amount of the corporate tax is included in household income measured before taxes.
- **Other income** - includes income received in retirement for past services and any other sources of income.

Source: CBO

## Household Transfer and After Tax Income

**Transfer income** includes cash payments from Social Security, unemployment insurance, Supplemental Security Income, Aid to Families with Dependent Children, Temporary Assistance for Needy Families, veterans' benefits, workers' compensation, and state and local government assistance programs, as well as the value of in-kind benefits, including food stamps, school lunches and breakfasts, housing assistance, energy assistance, Medicare, Medicaid, and the Childrens Health Insurance Program (health benefits are measured as the fungible value, a Census Bureau estimate of the value to recipients).

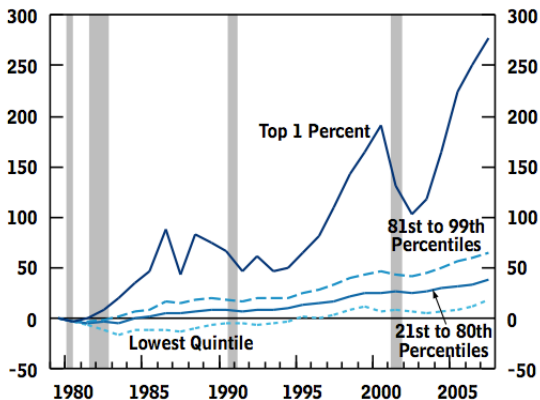
Source: CBO

**After-tax income** is equal to market income plus transfer income minus federal taxes paid. In assessing the impact of various taxes, individual income taxes are allocated directly to households paying those taxes. Social insurance, or payroll, taxes are allocated to households paying those taxes directly or paying them indirectly through their employers. Corporate income taxes are allocated to households according to their share of capital income. Federal excise taxes are allocated to households according to their consumption of the taxed good or service.

Source: CBO

## Cumulative Growth in Average After-Tax Income, by Income Group

(Percentage change in income since 1979, adjusted for inflation)

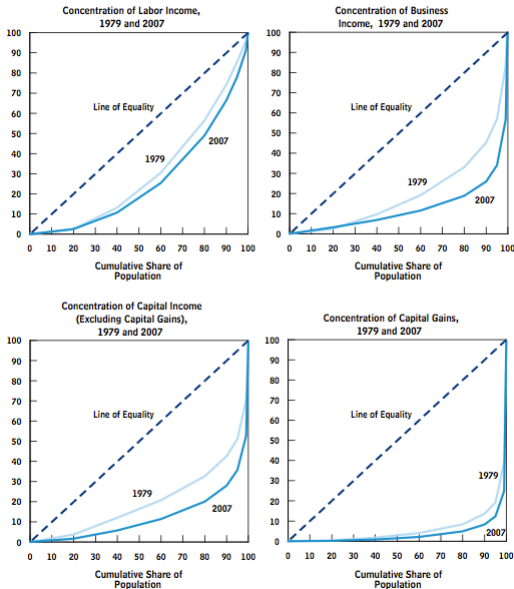


Source: Congressional Budget Office.

Income — Average real after-tax *household* income.

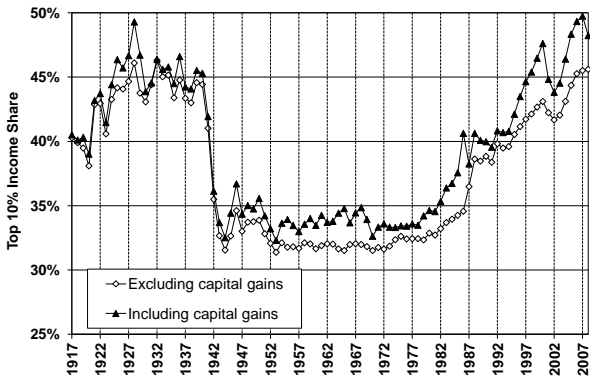
## Concentration of Major Sources of Market Income, 1979 and 2007

(Cumulative share of income, in percent)



Source: Congressional Budget Office.





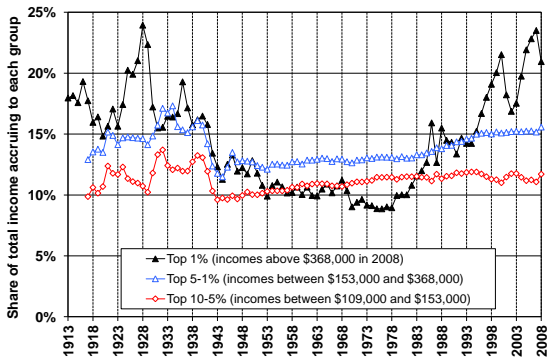
**FIGURE 1**  
The Top Decile Income Share, 1917-2008

Source: Table A1 and Table A3, col. P90-100.

Income is defined as market income (and excludes government transfers).

In 2008, top decile includes all families with annual income above \$109,000.

Source: "Income inequality in the United States, 1913–2002" by Piketty and Saez (QJE, 2004) (updates are available from their website)



**FIGURE 2**

Decomposing the Top Decile US Income Share into 3 Groups, 1913-2008

Source: Piketty and Saez (2003), series updated to 2008.

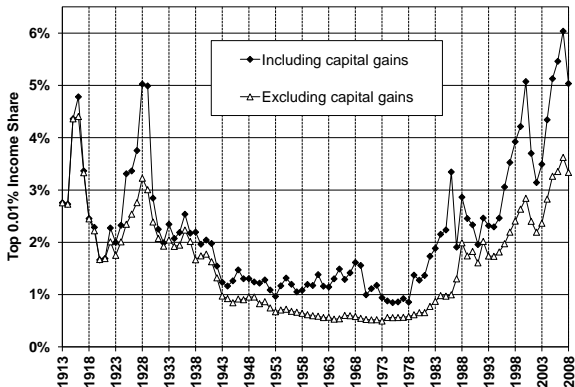
Income is defined as market income including capital gains.

Top 1% denotes the top percentile (families with annual income above \$368,000 in 2008)

Top 5-1% denotes the next 4% (families with annual income between \$153,000 and \$368,000 in 2008)

Top 10-5% denotes the next 5% (bottom half of the top decile, families with annual income between \$109,000 and \$153,000 in 2008).

Source: "Income inequality in the United States, 1913–2002" by Piketty and Saez (QJE, 2004) (updates are available from their website)



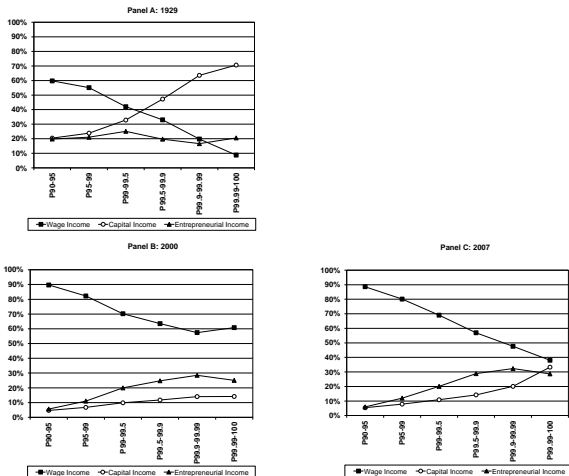
**FIGURE 3**  
The Top 0.01% Income Share, 1913-2008

Source: Piketty and Saez (2003), series updated to 2008.

Income is defined as market income including (or excluding) capital gains.

In 2008, top .01% includes the 15,246 top families with annual income above \$9,141,000.

Source: "Income inequality in the United States, 1913–2002" by Piketty and Saez (QJE, 2004) (updates are available from their website)



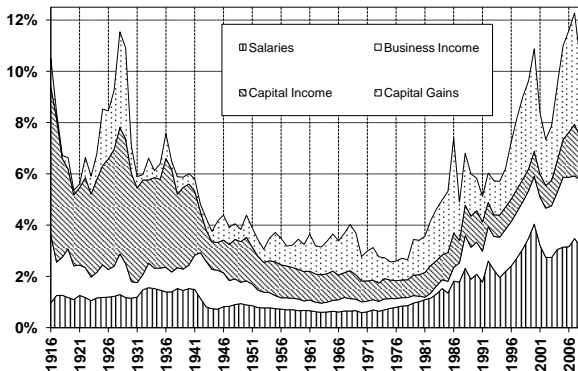
**FIGURE 4**  
Income Composition of Top Groups within the Top Decile in 1929, 2000, and 2007

Source: “Income inequality in the United States, 1913–2002” by Piketty and Saez (QJE, 2004) (updates are available from their website)

Percentage of primary taxpayers in the top 0.1% of the income distribution (including capital gains) that are in each occupation, United States, 2004

Occupation	%
Executives, managers, supervisors (non-finance)	41
Financial professions (including management)	18
Not working	6
Lawyers, real estate	11
Medical	4
Other	20

Source: Bakija et al. (2010).

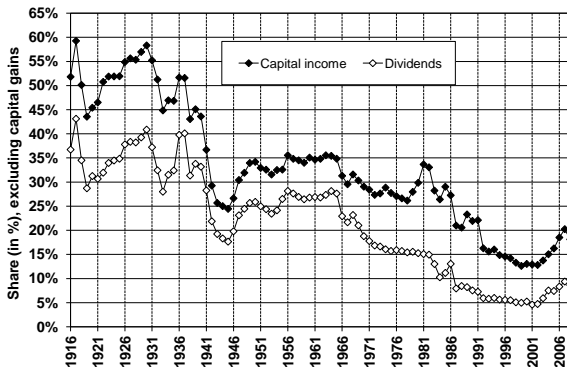


**FIGURE 4B**

The Top 0.1% Income Share and Composition, 1916-2008

The Figure displays the top 0.1% income share and its composition.  
 Top 0.1% defined by market income including realized capital gains  
 Source: Table A3, Table A7, and Table A8, col. P99.9-100.

Source: "Income inequality in the United States, 1913–2002" by Piketty and Saez (QJE, 2004) (updates are available from their website)



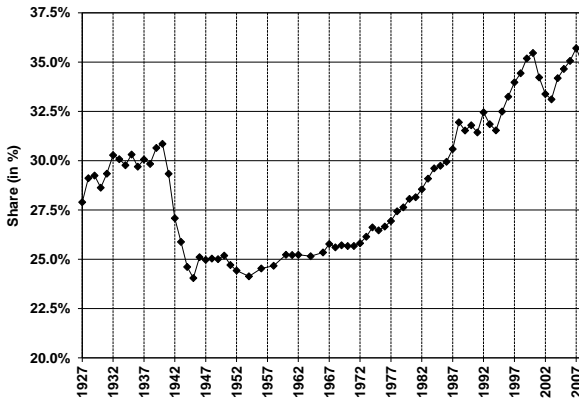
**FIGURE 5**

The Capital Income Share in the Top 0.5%, 1916-2008

Series display the share of capital income (excluding capital gains) and dividends in total income (excluding capital gains) for the top 0.5% income quintile.

Source: Table A7, column P99.5-100

Source: "Income inequality in the United States, 1913–2002" by Piketty and Saez (QJE, 2004) (updates are available from their website)

**FIGURE 8**

The Top Decile Wage Income Share, 1927-2008

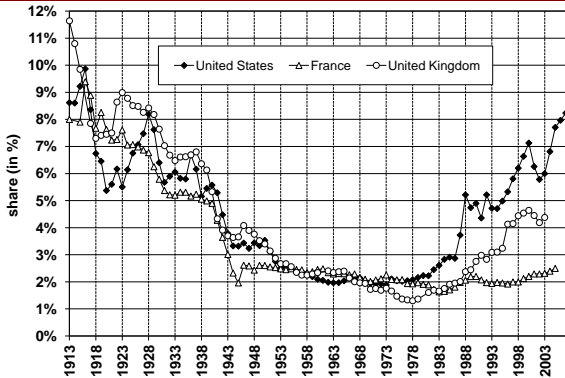
Source: Table B2, col. P90-100.

Wage income includes bonuses, and profits from exercised stockoptions.

Source: "Income inequality in the United States, 1913–2002" by Piketty and Saez (QJE, 2004) (updates are available from their website)



## International Perspectives



**FIGURE 12**

Top 0.1% Income Shares in the U.S., France, and the U.K., 1913-2007

Sources: United States: Table A1, column P99.9-100.

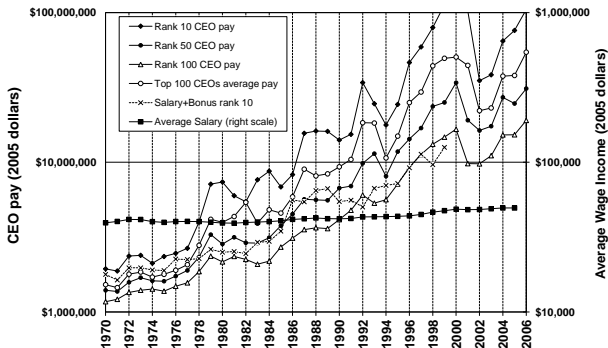
France: Computations based on income tax returns by Piketty (2001b), Table A1, col. P99.9-100, and Landais (2007).

United Kingdom: Computations based on income tax returns by Atkinson (2001), col. Top 0.1% in Tables 1 and 4, and Brewer, Saez, and Shepard (2008).

In all three countries, income is defined before individual taxes and excludes capital gains.

The unit is the family as in the current U.S. tax law.

Source: "Income inequality in the United States, 1913–2002" by Piketty and Saez (QJE, 2004) (updates are available from their website)



**FIGURE 11**  
CEO Pay versus Average Wage Income, 1970-2006

Source: Table B4. Logarithmic scales.

The average wage income (right scale) is estimated as the total wages and salaries from National Income and Products Accounts divided by the total number of full-time equivalent employees.

CEO pay includes salary, bonus, and profits from exercised stock-options

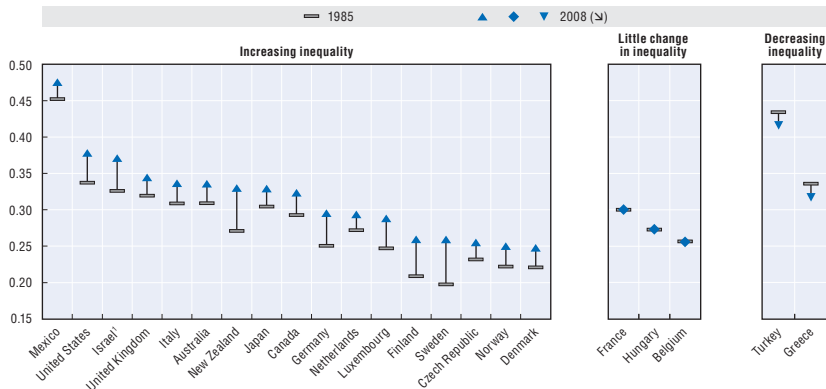
All estimates are expressed in 2005 dollars using the official CPI.

Source: "Income inequality in the United States, 1913–2002" by Piketty and Saez (QJE, 2004) (updates are available from their website)

## 2. An Overview of Growing Income Inequalities in OECD Countries

# Income inequality increased in most, but not all OECD countries

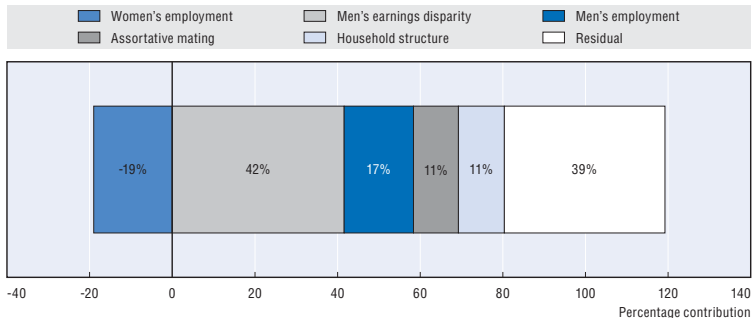
Gini coefficients of income inequality, mid-1980s and late 2000s



Note: Income refers to **household** income. For data years see Table 1. Little change in inequality refers to changes of less than 2 percentage points.

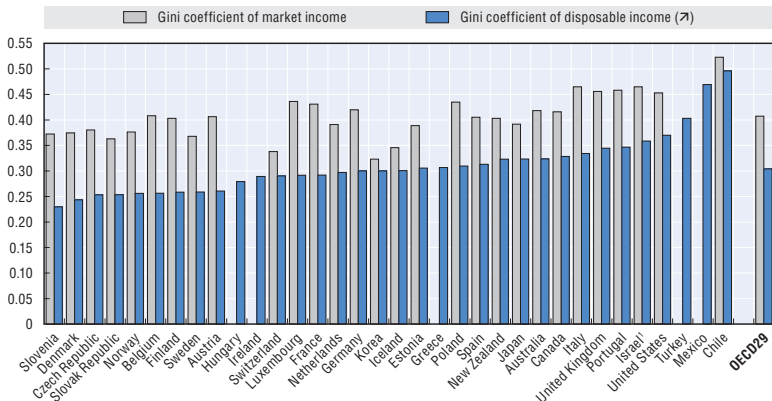
## Demographic changes were less important than labour market trends in explaining changes in **household** earnings distribution

Percentage contributions to changes in household earnings inequality, OECD average, mid-1980s to mid-2000s



# Market incomes are distributed much more unequally than net incomes

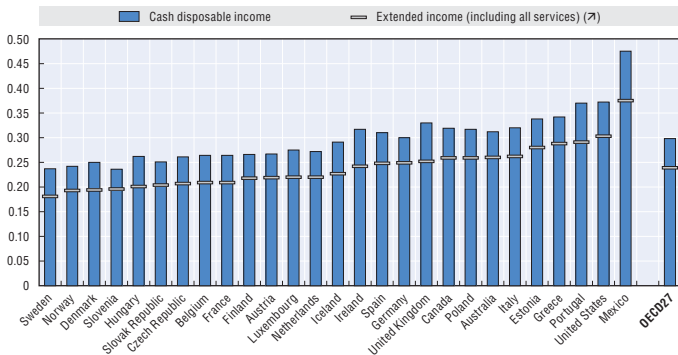
Inequality (Gini coefficient) of market income and disposable (net) income in the OECD area, working-age persons, late 2000s



Note: Income refers to **household** income. Late 2000s refers to a year between 2006 and 2009. The OECD average excludes Greece, Hungary, Ireland, Mexico and Turkey (no information on market income available). Working age is defined as 18-65 years old. Countries are ranked in increasing order of disposable income inequality.

## In-kind benefits from public services are redistributive in all OECD countries

Household income inequality (Gini coefficients) before and after accounting for services from education, health, social housing and care services, 2007

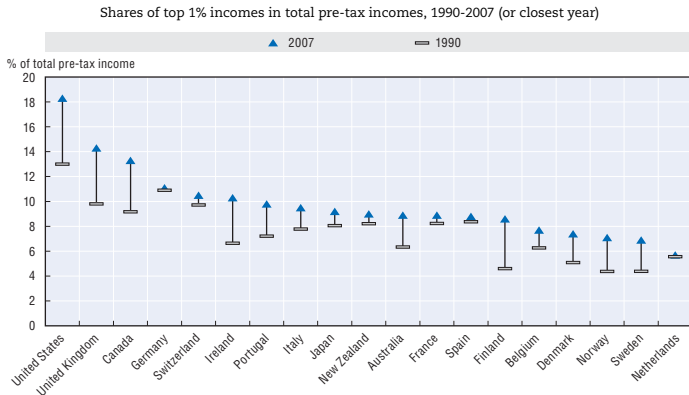


*Note:* Income refers to **household** income. Countries are ranked in increasing order of inequality of extended income, i.e. disposable income adjusted for the money value of services in education, health care, social housing, and the care of children and the elderly.

*Source:* Chapter 8, Table 8.2.



## The share of top incomes increased, especially in English-speaking countries



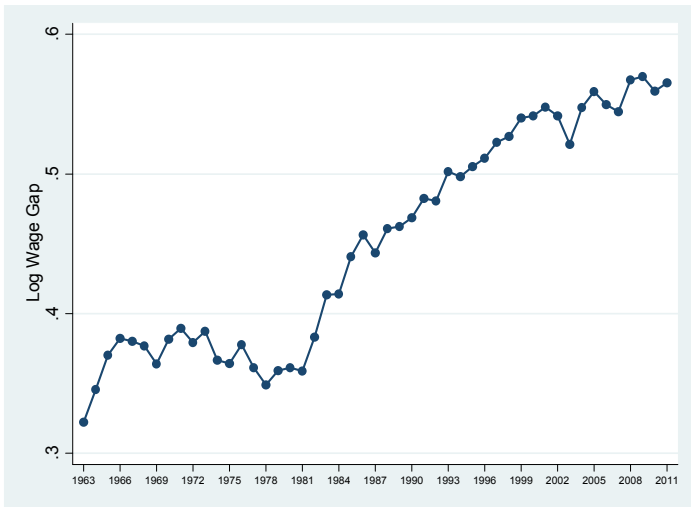
*Note:* Income refers to **household** income. 2007 values refer to 2006 for Belgium, France and Switzerland; 2005 for Japan, Netherlands, New Zealand, Portugal, Spain and the United Kingdom; 2004 for Finland; and 2000 for Germany and Ireland. Countries are ranked by decreasing shares in the latest year.

*Source:* Chapter 9, Figure 9.A2.2.

### 3. Wages at a Point in Time and Evolution of Distributions of Wages

- Presumption in the literature is that wages are the prices of skills.

## Composition Adjusted College/High-School Log Weekly Wage Ratio

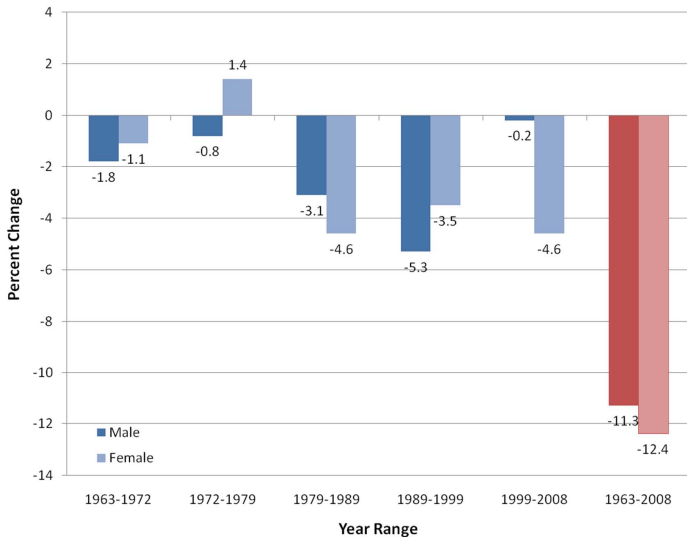


Source: IPUMS CPS 1963-2011

Sample: Workers aged 16 to 64 who participate in the labor force on a full-time, full-year basis, defined as working 35-plus hours per week and 40-plus weeks per year. Self-employed workers are excluded.

Adjustment for composition (steps): (1) The sample was divided into eighty demographic groups (five education categories, four potential experience levels, two genders and two race categories). (2) For each group, it was computed the weighted average employment share for the period 1967-2011. (3) The log real weekly wages are predicted in each year for eighty sex-education-race-experience groups using an OLS of observed wages on race, five education dummies and a quartic polynomial of experience separately by six gender-education cells. (4) Finally, log real weekly wages in year  $t$  are defined as a fixed-weighted averages of the relevant subgroup means, using the average share of total hours worked for each group across all years of the sample as weights.

### Percent change in the relative weekly wages of high school dropouts to high school graduates, CPS March 1963-2008



### Percent change in the relative weekly wages of high school dropouts to college graduates, CPS March 1963-2008

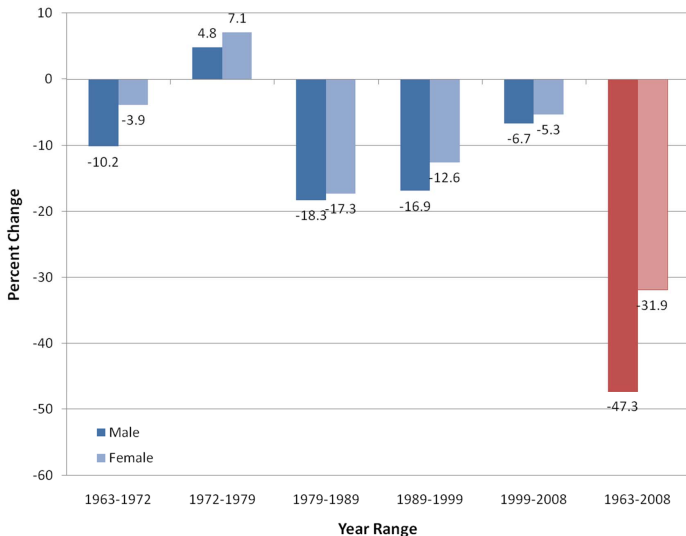
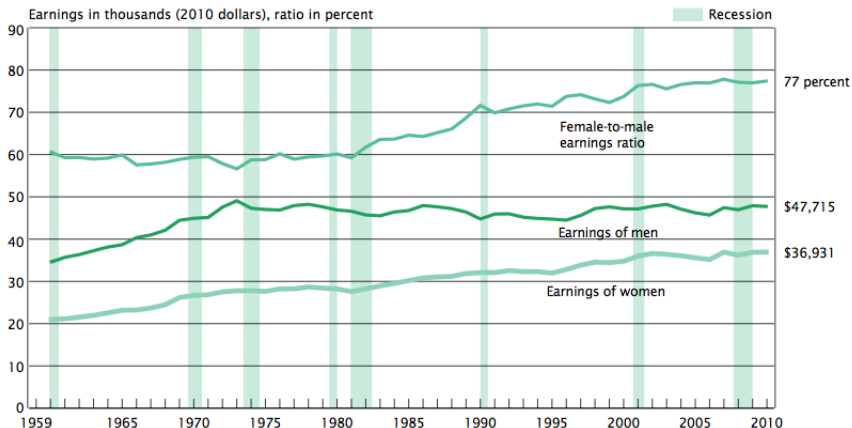
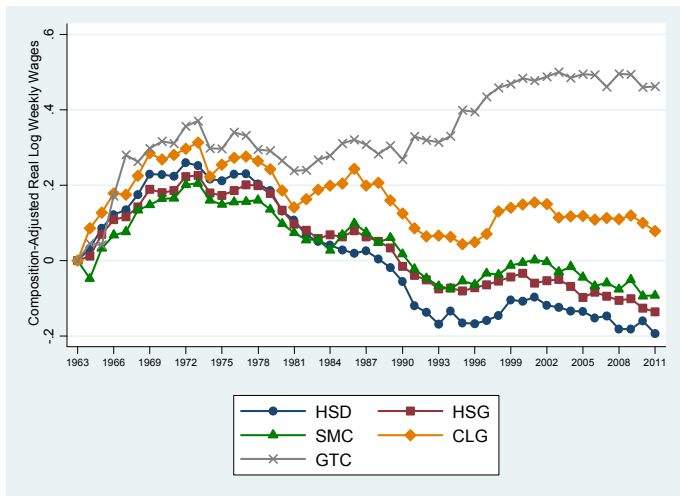


Figure 2.  
**Female-to-Male Earnings Ratio and Median Earnings of Full-Time, Year-Round Workers  
 15 Years and Older by Sex: 1960 to 2010**



Note: Data on earnings of full-time, year-round workers are not readily available before 1960. For information on recessions, see Appendix A.  
 Source: U.S. Census Bureau, Current Population Survey, 1961 to 2011 Annual Social and Economic Supplements.

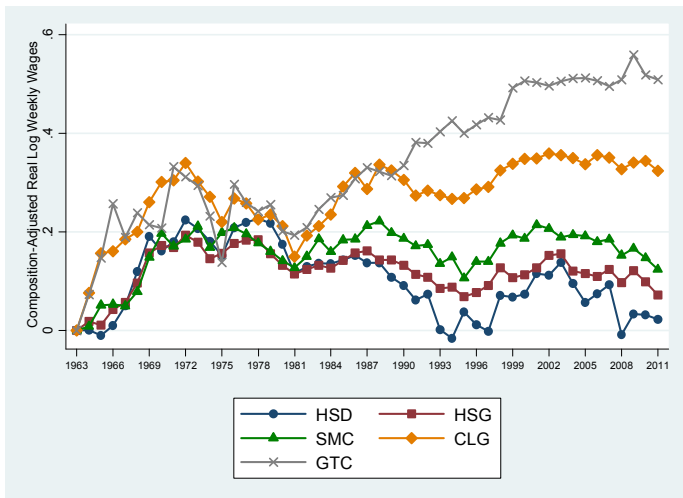
# Real, Composition-Adjusted Log Weekly Wages for Full-Time Full-Year Workers Males



Source: IPUMS CPS 1963-2011

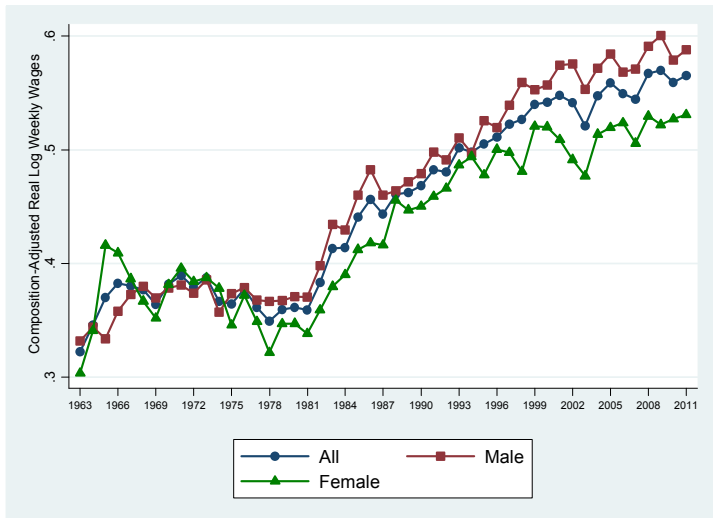


# Real, Composition-Adjusted Log Weekly Wages for Full-Time Full-Year Workers Females



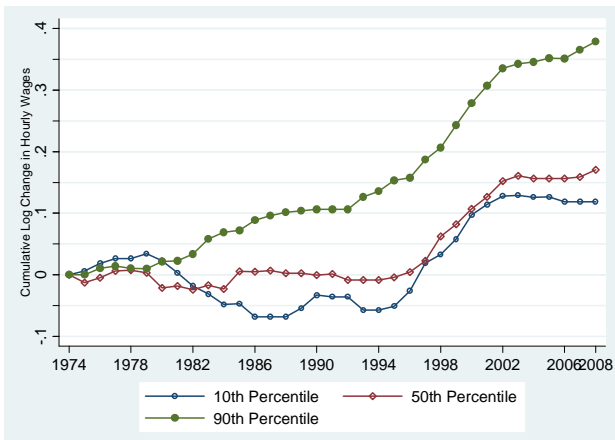
Source: IPUMS CPS 1963-2011

# College-HS Log Weekly Wage Gaps by Gender, March CPS



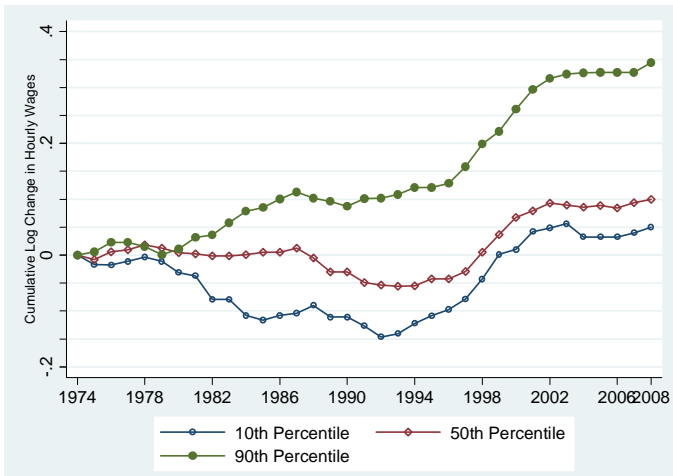
Source: IPUMS CPS 1963-2011

## Cumulative Log Change in Real Hourly Earnings at the 90th, 50th and 10th Wage Percentiles: Males and Females



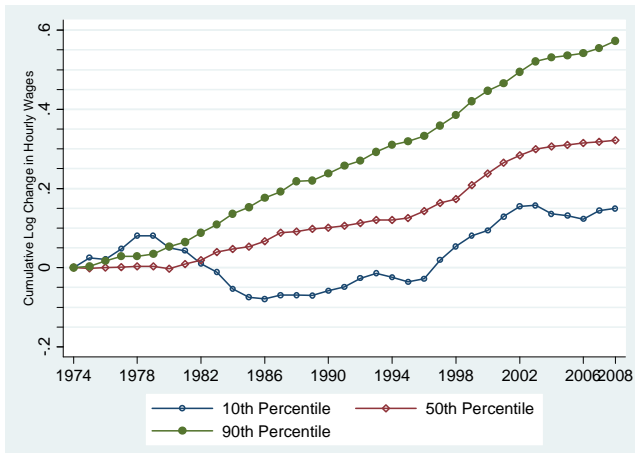
Source: Recreated from Acemoglu and Autor, 2011

## Cumulative Log Change in Real Hourly Earnings at the 90th, 50th and 10th Wage Percentiles: Males



Source: Recreated from Acemoglu and Autor, 2011

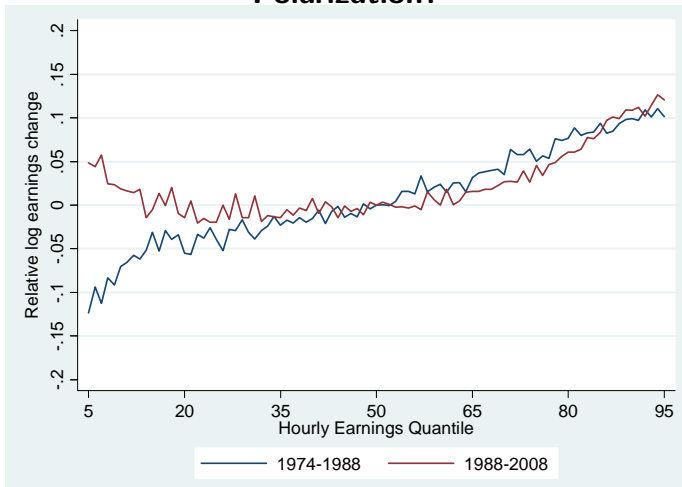
## Cumulative Log Change in Real Hourly Earnings at the 90th, 50th and 10th Wage Percentiles: Females



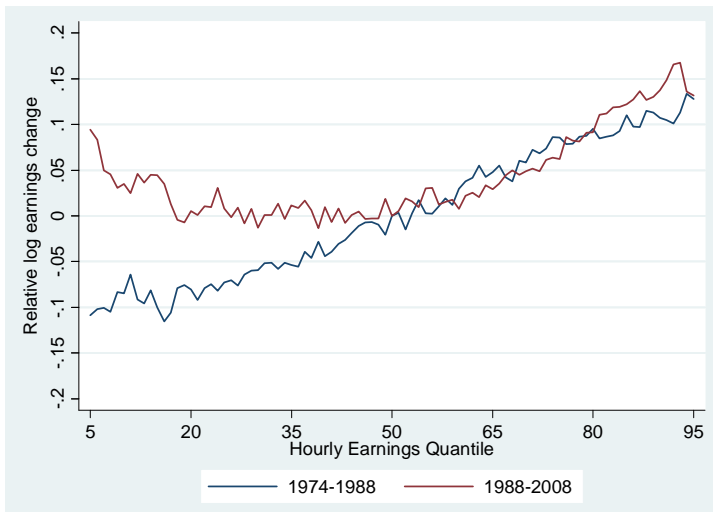
Source: Recreated from Acemoglu and Autor, 2011

# Changes in Male & Female Log Hourly Wages by Percentile Relative to the Median

## Polarization?

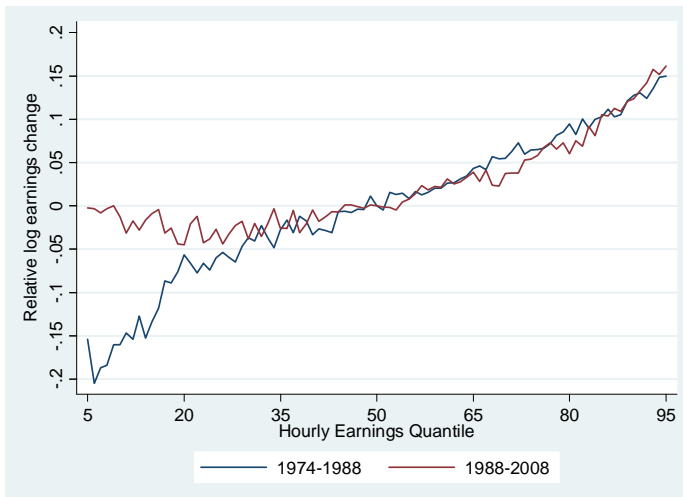


## Changes in Male Log Hourly Wages by Percentile Relative to the Median



Source: Recreated from Acemoglu and Autor, 2011

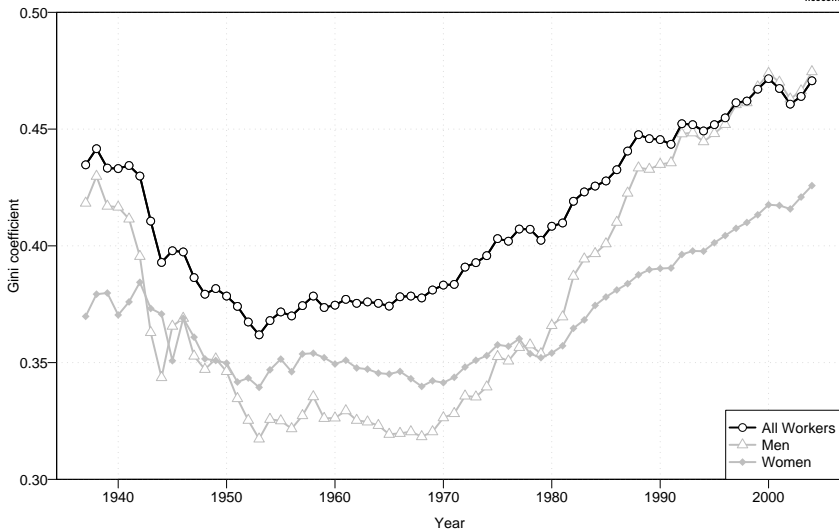
## Changes in Female Log Hourly Wages by Percentile Relative to the Median



Source: Recreated from Acemoglu and Autor, 2011

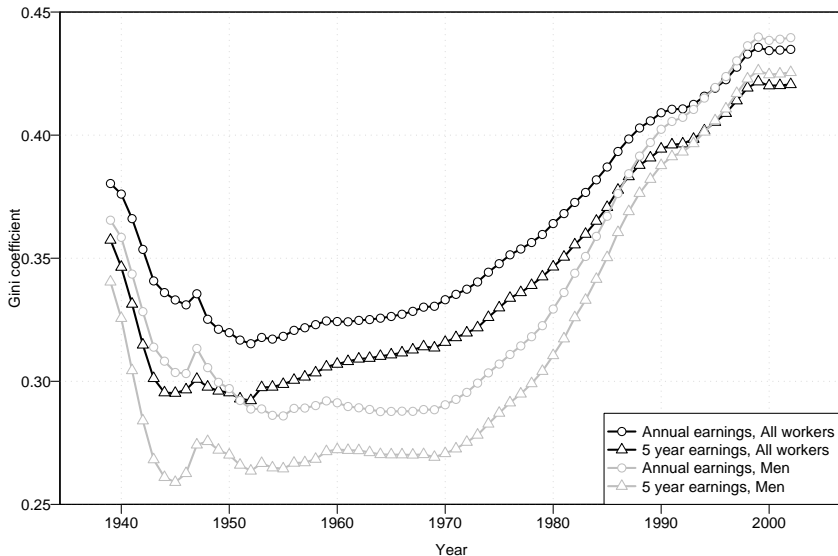


Figure 1: Gini coefficient



## Permanent vs. Transitory Differences

Figure 3: Gini coefficient: Annual Earnings vs 5-Year Earnings



**Figure 5: Variance of Annual, Permanent and Transitory (log) Earnings**

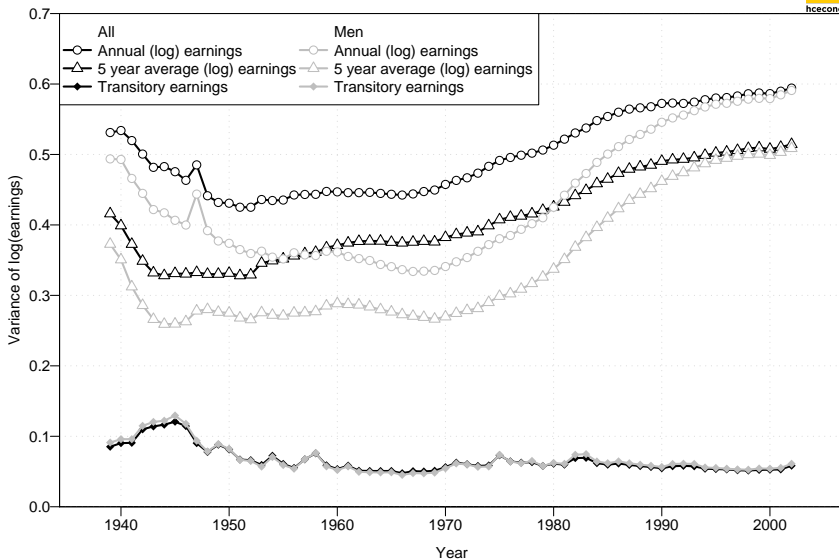


Figure 6A: Top 1% Earnings Share : Annual vs Multi-Year Earnings

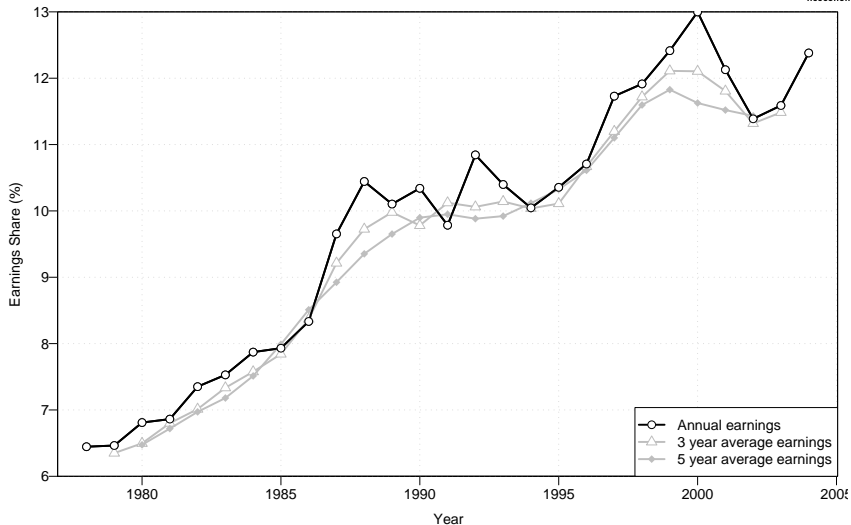
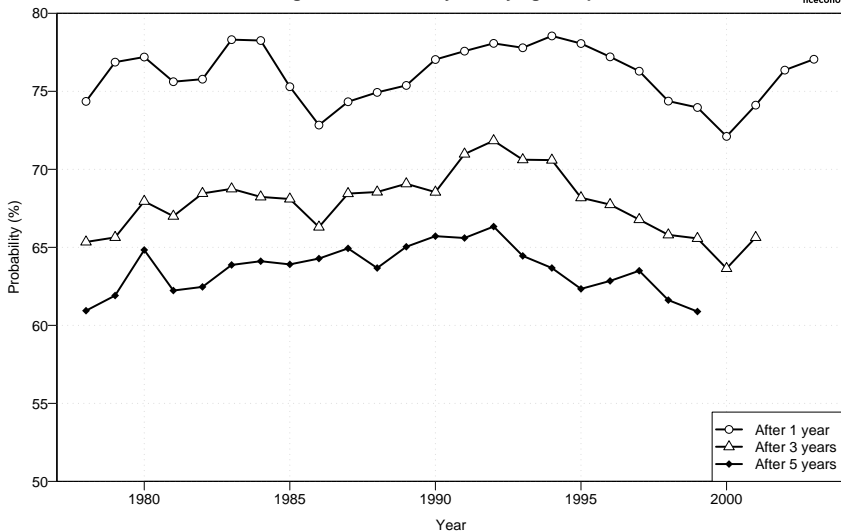


Figure 6B: Probability of Staying in Top 1%



**Hourly wage decomposed into attribute sources:  
education, experience, cognition and personality  
traits**

# Labor Market Outcomes Decomposed into Education Experience Cognition and Personality Ages 25-29 NLSY79 (Adjusted R-Squared): Males

	AFQT Sample				GPA Sample			
	Log Hourly Wage	Log Annual Earnings	Employment	Annual Hours	Log Hourly Wage	Log Annual Earnings	Employment	Annual Hours
<b>Male</b>								
Education	0.10	0.11	0.06	0.04	0.10	0.11	0.06	0.04
Experience	0.05	0.13	0.12	0.26	0.05	0.13	0.12	0.26
Personality	0.07	0.07	0.05	0.03	0.07	0.07	0.05	0.03
Cognition	0.10	0.10	0.04	0.03	0.06	0.06	0.04	0.02
Education&Experience	0.16	0.25	0.17	0.30	0.16	0.25	0.17	0.30
Personality&Cognition	0.13	0.12	0.07	0.04	0.10	0.10	0.06	0.03
Education&Cognition	0.13	0.14	0.08	0.05	0.11	0.12	0.07	0.04
Education&Personality	0.12	0.13	0.08	0.05	0.12	0.13	0.08	0.05
Experience&Cognition	0.11	0.19	0.16	0.28	0.11	0.19	0.16	0.28
Experience&Personality	0.15	0.22	0.15	0.28	0.11	0.20	0.16	0.28
All	0.20	0.28	0.19	0.30	0.19	0.27	0.19	0.30

# Labor Market Outcomes Decomposed into Education Experience Cognition and Personality Ages 25-29 NLSY79 (Adjusted R-Squared): Females

	AFQT Sample				GPA Sample			
	Log Hourly Wage	Log Annual Earnings	Employment	Annual Hours	Log Hourly Wage	Log Annual Earnings	Employment	Annual Hours
<b>Female</b>								
Education	0.15	0.10	0.05	0.09	0.15	0.10	0.05	0.09
Experience	0.12	0.22	0.19	0.30	0.12	0.22	0.19	0.30
Personality	0.08	0.05	0.03	0.04	0.08	0.05	0.03	0.04
Cognition	0.14	0.07	0.04	0.05	0.07	0.04	0.02	0.03
Education&Experience	0.24	0.28	0.20	0.32	0.24	0.28	0.20	0.32
Personality&Cognition	0.17	0.09	0.05	0.07	0.12	0.07	0.04	0.05
Education&Cognition	0.20	0.12	0.07	0.10	0.16	0.11	0.06	0.09
Education&Personality	0.18	0.11	0.06	0.09	0.18	0.11	0.06	0.09
Experience&Cognition	0.17	0.23	0.20	0.30	0.17	0.23	0.20	0.30
Experience&Personality	0.22	0.25	0.20	0.30	0.16	0.24	0.19	0.30
All	0.28	0.29	0.21	0.32	0.26	0.28	0.21	0.32



# Labor Market Outcomes Decomposed into Education Experience Cognition and Personality Ages 25-29 NLSY97 (Adjusted R-Squared): Males

	AFQT Sample				PIAT Sample			
	Log Hourly Wage	Log Annual Earnings	Employment	Annual Hours	Log Hourly Wage	Log Annual Earnings	Employment	Annual Hours
<b>Male</b>								
Education	0.05	0.05	0.06	0.04	0.05	0.05	0.06	0.04
Experience	0.02	0.09	0.11	0.23	0.02	0.09	0.11	0.23
Personality	0.07	0.14	0.06	0.09	0.08	0.13	0.11	0.10
Cognition	0.02	0.03	0.01	0.01	0.03	0.05	0.01	0.01
Education&Experience	0.08	0.18	0.15	0.28	0.08	0.18	0.15	0.28
Personality&Cognition	0.08	0.14	0.07	0.09	0.14	0.20	0.22	0.13
Education&Cognition	0.05	0.06	0.05	0.04	0.05	0.07	0.05	0.04
Education&Personality	0.10	0.16	0.08	0.10	0.11	0.18	0.15	0.14
Experience&Cognition	0.08	0.20	0.15	0.25	0.09	0.19	0.26	0.30
Experience&Personality	0.04	0.15	0.12	0.24	0.07	0.16	0.12	0.25
All	0.12	0.25	0.17	0.28	0.18	0.30	0.39	0.34

## Labor Market Outcomes Decomposed into Education Experience Cognition and Personality Ages 25-29 NLSY97 (Adjusted R-Squared): Females

	AFQT Sample				PIAT Sample			
	Log Hourly Wage	Log Annual Earnings	Employment	Annual Hours	Log Hourly Wage	Log Annual Earnings	Employment	Annual Hours
<b>Female</b>								
Education	0.15	0.13	0.07	0.10	0.15	0.13	0.07	0.10
Experience	0.02	0.12	0.10	0.21	0.02	0.12	0.10	0.21
Personality	0.09	0.12	0.07	0.12	0.09	0.15	0.12	0.14
Cognition	0.06	0.07	0.01	0.05	0.06	0.08	0.02	0.05
Education&Experience	0.17	0.27	0.13	0.27	0.17	0.27	0.13	0.27
Personality&Cognition	0.13	0.17	0.08	0.14	0.18	0.21	0.25	0.21
Education&Cognition	0.16	0.15	0.07	0.10	0.16	0.18	0.07	0.12
Education&Personality	0.18	0.20	0.10	0.16	0.19	0.21	0.16	0.18
Experience&Cognition	0.10	0.21	0.15	0.25	0.10	0.24	0.22	0.28
Experience&Personality	0.07	0.19	0.10	0.21	0.08	0.18	0.12	0.23
All	0.21	0.31	0.16	0.28	0.24	0.31	0.37	0.37

# Labor Market Outcomes Decomposed into Education Experience Cognition and Personality Ages 30-40 NLSY79 (Adjusted R-Squared): Males

	AFQT Sample				GPA Sample			
	Log Hourly Wage	Log Annual Earnings	Employment	Annual Hours	Log Hourly Wage	Log Annual Earnings	Employment	Annual Hours
<b>Male</b>								
Education	0.16	0.13	0.08	0.06	0.16	0.13	0.08	0.06
Experience	0.06	0.10	0.14	0.22	0.06	0.10	0.14	0.22
Personality	0.08	0.07	0.05	0.04	0.08	0.07	0.05	0.04
Cognition	0.16	0.12	0.05	0.04	0.08	0.07	0.04	0.03
Education&Experience	0.21	0.23	0.19	0.25	0.21	0.23	0.19	0.25
Personality&Cognition	0.18	0.14	0.08	0.05	0.12	0.11	0.07	0.05
Education&Cognition	0.21	0.17	0.10	0.07	0.17	0.14	0.09	0.06
Education&Personality	0.17	0.15	0.10	0.06	0.17	0.15	0.10	0.06
Experience&Cognition	0.13	0.16	0.17	0.23	0.13	0.16	0.17	0.23
Experience&Personality	0.21	0.21	0.17	0.24	0.14	0.17	0.17	0.24
All	0.26	0.26	0.20	0.25	0.24	0.25	0.20	0.25

# Labor Market Outcomes Decomposed into Education Experience Cognition and Personality Ages 30-40 NLSY79 (Adjusted R-Squared): Females

	AFQT Sample				GPA Sample			
	Log Hourly Wage	Log Annual Earnings	Employment	Annual Hours	Log Hourly Wage	Log Annual Earnings	Employment	Annual Hours
<b>Female</b>								
Education	0.18	0.08	0.03	0.03	0.18	0.08	0.03	0.03
Experience	0.15	0.21	0.18	0.26	0.15	0.21	0.18	0.26
Personality	0.08	0.03	0.01	0.01	0.08	0.03	0.01	0.01
Cognition	0.15	0.05	0.01	0.01	0.07	0.03	0.01	0.01
Education&Experience	0.27	0.25	0.18	0.26	0.27	0.25	0.18	0.26
Personality&Cognition	0.18	0.07	0.02	0.02	0.12	0.05	0.02	0.02
Education&Cognition	0.23	0.09	0.03	0.03	0.20	0.08	0.03	0.03
Education&Personality	0.20	0.09	0.03	0.03	0.20	0.09	0.03	0.03
Experience&Cognition	0.19	0.22	0.18	0.26	0.19	0.22	0.18	0.26
Experience&Personality	0.24	0.23	0.18	0.26	0.19	0.22	0.18	0.26
All	0.30	0.25	0.18	0.26	0.29	0.25	0.18	0.26

## Labor Market Outcomes Decomposed into Education Experience Cognition and Personality Ages 30-40 NLSY79 (Adjusted R-Squared)

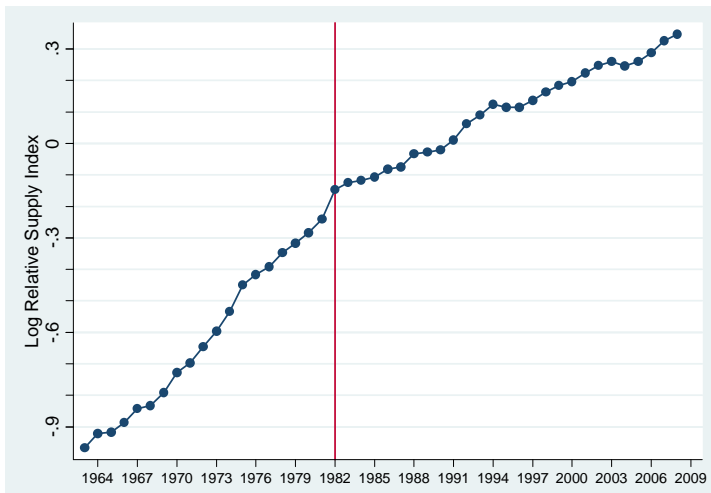
**Source:** National Longitudinal Survey of Youth 1979. **Notes:** The measures of personality traits include minor illegal activity in 1979 (vandalism, shoplifting, petty theft, fraud and fencing), major illegal activity in 1979 (auto theft, breaking/entering private property, grand theft), participation in violent crime in 1979 (fighting, assault and aggravated assault), tried marijuana before age 15, daily smoking before age 15, regular drinking before age 15, and any intercourse before age 15. It also includes measures of self-esteem and locus of control. Self-esteem is measured using the ten-item Rosenberg scale administered in 1980. Locus of control is a measure of how much control an individual believes they have over their life and is measured using the 4-item Rotter scale. The Armed Forces Qualification Test (AFQT) was adjusted for schooling at the time of the test conditional on nal schooling as described in Hansen et al. (2004). Experience is measured as actual experience accumulated from age 16. Education is measured by dummy variables for highest degree completed.

## 4. Educational Responses to Rising Wage Differentials

## **The surprising nature of the supply response to increased “returns” to schooling**

Even though prices increase, supply response is sluggish. For some dimensions even perverse.

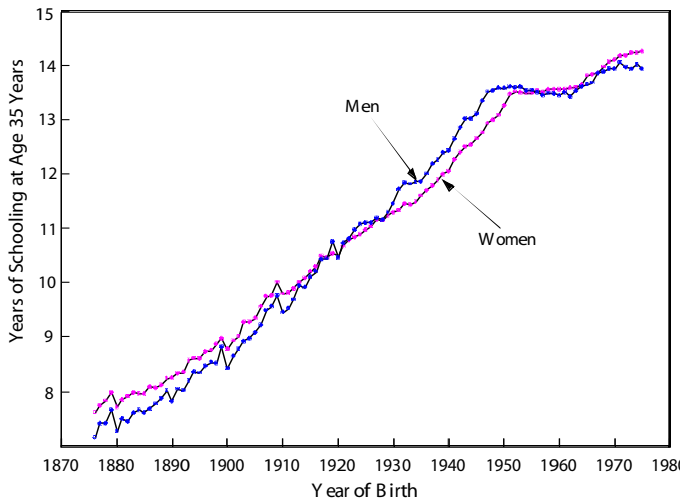
## College/High-School Log Relative Supply



Source: Recreated from Acemoglu and Autor, 2011



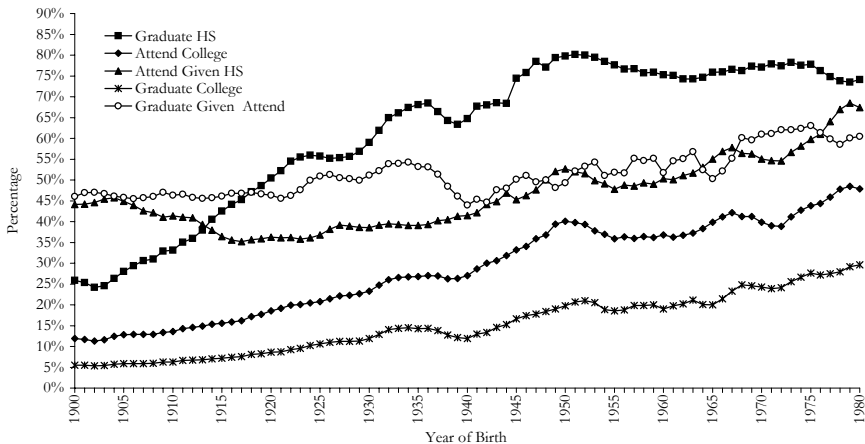
## Years of Schooling by Birth Cohort, U.S. Natives by Sex: 1876 to 1975



## The Slowdown in the Supply of Skilled Labor is Partly Due to a Declining High School Graduation Rate

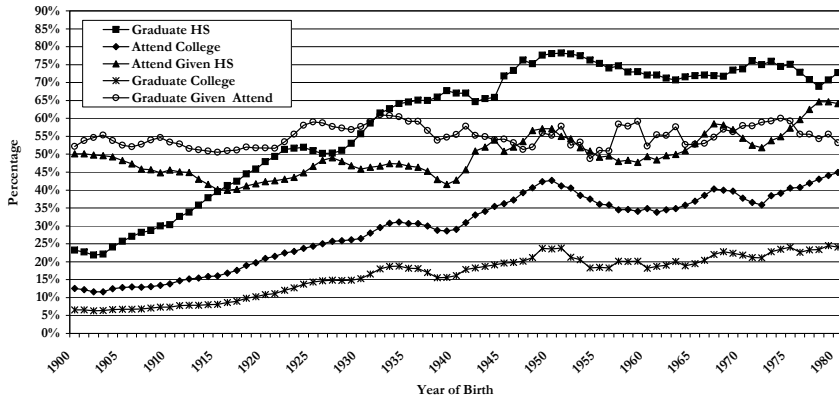
- Begs question of what produces a declining high school graduation rate.

# Educational Attainment Decompositions, Males and Females 1900-1980 Birth Cohorts



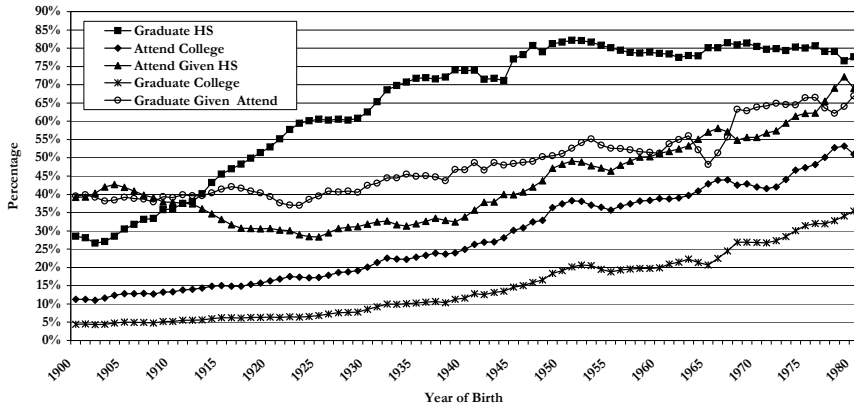
# Educational Attainment Decompositions, Males 1900-1980

## Birth Cohorts



# Educational Attainment Decompositions, Females 1900-1980

## Birth Cohorts



## Decomposition of the Change in College Graduation, Pre and Post 1950 Birth Cohorts

H=High School, C=Attend College, D=Get a College Degree

Birth Cohort	Total Change	$\Delta$ due to $\Delta P(H)$	$\Delta$ due to $\Delta P(C   H)$	$\Delta$ due to $\Delta P(D   C)$	$\Delta$ due to Interaction
<b>A. Overall</b>					
1900-1949	13.89%	8.99%	3.17%	0.81%	0.92%
1950-1959	10.46%	-1.47%	6.70%	5.20%	0.03%
<b>B. Males</b>					
1900-1949	16.93%	12.38%	3.81%	0.40%	0.35%
1950-1959	2.26%	-1.59%	2.90%	0.86%	0.08%
<b>C. Females</b>					
1900-1949	13.72%	7.06%	3.69%	2.19%	0.78%
1950-1959	15.40%	-0.94%	9.50%	6.20%	0.65%

## Decomposition of the Sources of Change in College Graduation in the Cohorts Born Between 1900 and 1980. Broken Down by Birth Cohorts 1900-1949 vs. Birth Cohorts 1950-1980

Totals Pre- and Post-1950 Cohort	Change in College Graduation Rate due to Change in High School Graduation Rate
	Overall
Birth Years 1900-1949	8.99%
% of Total Change	64.71%
Birth Years 1950-1980	-1.47%
% of Total Change	-14.05%

Source: Heckman and LaFontaine (2007).

## Decomposition of the Sources of Change in College Graduation in the Cohorts Born Between 1900 and 1980. Broken Down by Birth Cohorts 1900-1949 vs. Birth Cohorts 1950-1980

Totals Pre- and Post-1950 Cohort	Change in College Graduation Rate due to Change in High School Graduation Rate
	Males
Birth Years 1900-1949	12.38%
% of Total Change	73.10%
Birth Years 1950-1980	-1.59%
% of Total Change	-70.02%

Source: Heckman and LaFontaine (2007).



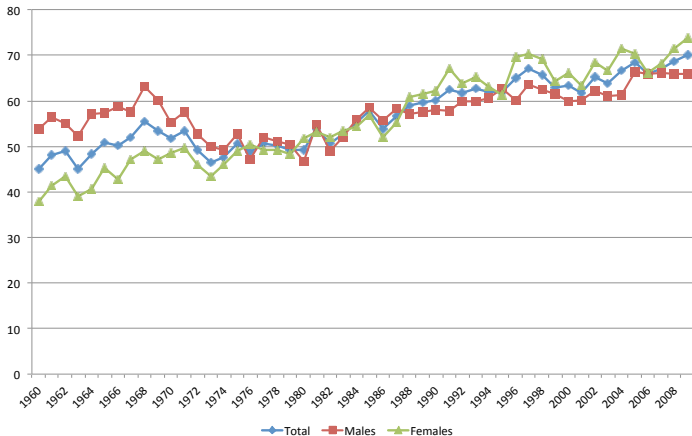
## Decomposition of the Sources of Change in College Graduation in the Cohorts Born Between 1900 and 1980. Broken Down by Birth Cohorts 1900-1949 vs. Birth Cohorts 1950-1980

Totals Pre- and Post-1950 Cohort	Change in College Graduation Rate due to Change in High School Graduation Rate
	Females
Birth Years 1900-1949	7.06%
% of Total Change	51.44%
Birth Years 1950-1980	-0.94%
% of Total Change	-6.13%

Source: Heckman and LaFontaine (2007).

# College enrollment rates among high school completers has increased

## College enrollment rates of recent high school completers, by sex



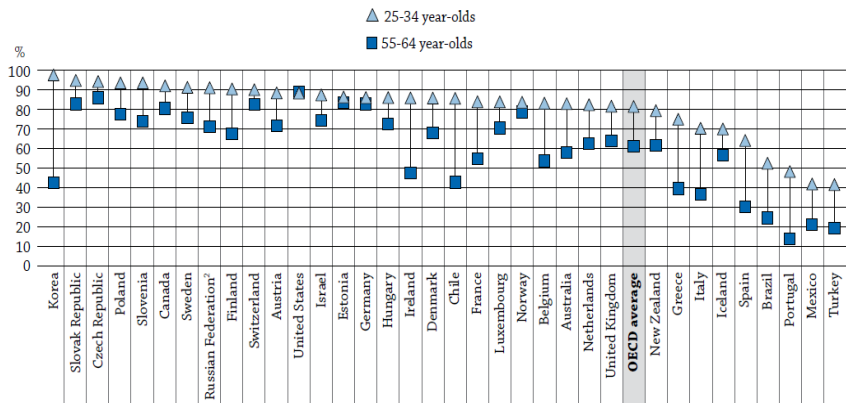
Notes: Individuals ages 16 to 24 who graduated from high school or completed a GED during the preceding 12 months.

High school completers include GED recipients.

Source: Digest of Education Statistics 2010. American College Testing Program, unpublished tabulations, derived from statistics collected by the Census Bureau, 1960 through 1969. U.S. Department of Commerce, Census Bureau, Current Population Survey (CPS), October, 1970 through 2009. (This table was prepared August 2010.)

# U.S. Educational Attainment in an International Perspective

## Percentage of population that has attained at least upper secondary education, by age group (2009)



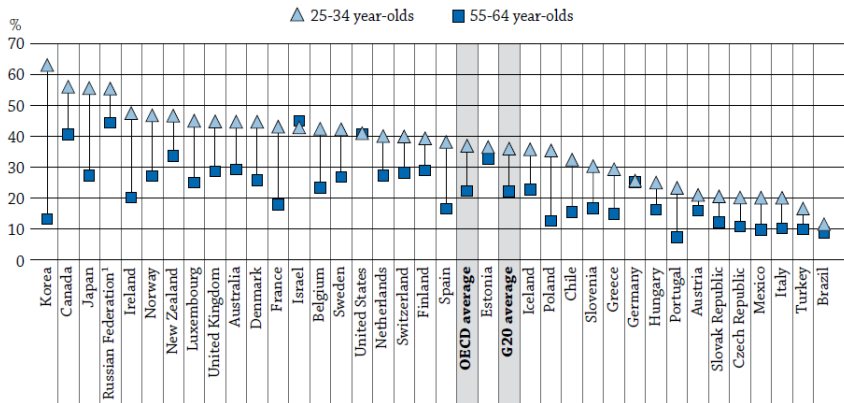
1. Excluding ISCED 3C short programmes.

2. Year of reference 2002.

Countries are ranked in descending order of the percentage of 25-34 year-olds who have attained at least upper secondary education.

Source: OECD, Table A1.2a. See Annex 3 for notes ([www.oecd.org/edu/eag2011](http://www.oecd.org/edu/eag2011)).

## Percentage of population that has attained tertiary education, by age group (2009)



1. Year of reference 2002.

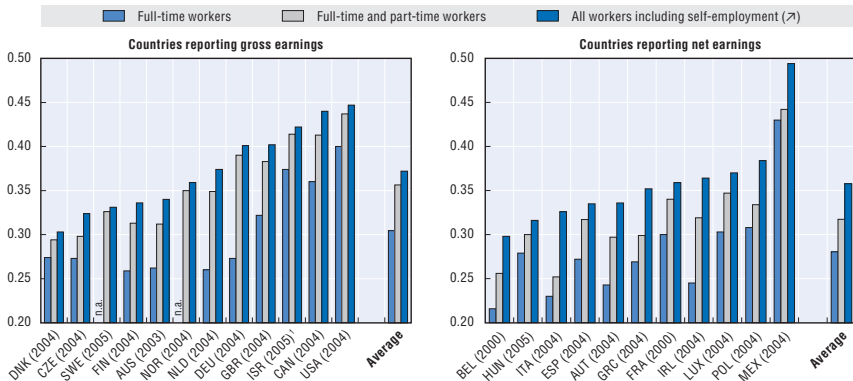
Countries are ranked in descending order of the percentage of 25-34 year-olds who have attained tertiary education.

Source: OECD, Table A1.3a. See Annex 3 for notes ([www.oecd.org/edu/eag2011](http://www.oecd.org/edu/eag2011)).

## 5. Inequality in Wages, Earnings, and Income: International Trends

### Trends in Wage Inequality

## Earnings inequality (Gini coefficient) among full-time workers, full-time and part-time workers and all workers, mid-2000s



**Note:** Data presented on the **individual** level. Samples are restricted to the civilian working-age population (25-64 years).  
n.a.: Not available.



# Decomposition of the variance of log annual earnings, paid workers, mid-2000s

Var(ln_annual earnings)	Var(ln_hourly wages)	Var(ln_annual hours)	2xCov(ln_hwage, ln_hours)
(1)	(2)	(3)	(4)

## Panel A. Countries reporting gross earnings

Australia 2003 <sup>1</sup>	0.460 (1.00)	0.210 (0.457)	0.255 (0.554)	-0.005 -(0.011)
Canada 2004	1.539 (1.00)	0.934 (0.607)	0.222 (0.144)	0.383 (0.249)
Czech Republic 2004 <sup>1</sup>	0.416 (1.00)	0.300 (0.721)	0.055 (0.132)	0.061 (0.147)
Finland 2004	1.085 (1.00)	0.553 (0.510)	0.233 (0.215)	0.298 (0.275)
Germany 2004	1.089 (1.00)	0.441 (0.405)	0.333 (0.306)	0.315 (0.289)
Israel 2005 <sup>2</sup>	0.769 (1.00)	0.504 (0.655)	0.198 (0.257)	0.066 (0.086)
Netherlands 2004	0.877 (1.00)	0.394 (0.449)	0.286 (0.326)	0.197 (0.225)
United Kingdom 2004 <sup>1</sup>	0.700 (1.00)	0.347 (0.496)	0.229 (0.327)	0.123 (0.176)
United States 2004	0.972 (1.00)	0.600 (0.617)	0.218 (0.224)	0.154 (0.158)
<b>Average</b>	0.879	0.476 (0.546)	0.225 (0.276)	0.177 (0.177)
		Corr(AE, hw) = 0.91	Corr(AE, ah) = 0.43	

*Note:* Data presented on the **individual** level. Samples are restricted to all paid workers (aged 25-64) with positive wages and positive hours worked during the reference year. For Finland, hourly wage is calculated based on imputed hours worked per week. Numbers in parentheses refer to the fraction of variance of log annual earnings.

1. Hourly wage is calculated based on imputed weeks worked.

2. Hourly wage is calculated based on working 52 weeks.

# Decomposition of the variance of log annual earnings, paid workers, mid-2000s

Var(ln_annual earnings)	Var(ln_hourly wages)	Var(ln_annual hours)	2xCov(ln_hwage, ln_hours)
(1)	(2)	(3)	(4)

Panel B. Countries reporting net earnings

Austria 2004	0.532	(1.00)	0.386	(0.726)	0.267	(0.502)	-0.121	-(0.227)
Belgium 2000	0.358	(1.00)	0.209	(0.584)	0.139	(0.388)	0.010	(0.028)
France 2000	0.654	(1.00)	0.273	(0.417)	0.308	(0.471)	0.073	(0.112)
Greece 2004	0.440	(1.00)	0.318	(0.723)	0.191	(0.434)	-0.069	-(0.157)
Hungary 2005	0.498	(1.00)	0.299	(0.600)	0.156	(0.313)	0.043	(0.086)
Ireland 2004	0.604	(1.00)	0.264	(0.437)	0.340	(0.563)	0.000	(0.000)
Italy 2004	0.326	(1.00)	0.238	(0.730)	0.137	(0.420)	-0.049	-(0.150)
Luxembourg 2004	0.582	(1.00)	0.330	(0.567)	0.200	(0.344)	0.052	(0.089)
Mexico 2004 <sup>2</sup>	0.846	(1.00)	0.813	(0.961)	0.142	(0.168)	-0.108	-(0.128)
Spain 2004	0.529	(1.00)	0.280	(0.529)	0.208	(0.393)	0.041	(0.078)
<b>Average</b>	0.537		0.341	(0.627)	0.209	(0.400)	-0.013	-(0.027)
			Corr(AE, hw) = 0.78		Corr(AE, ah) = 0.31			

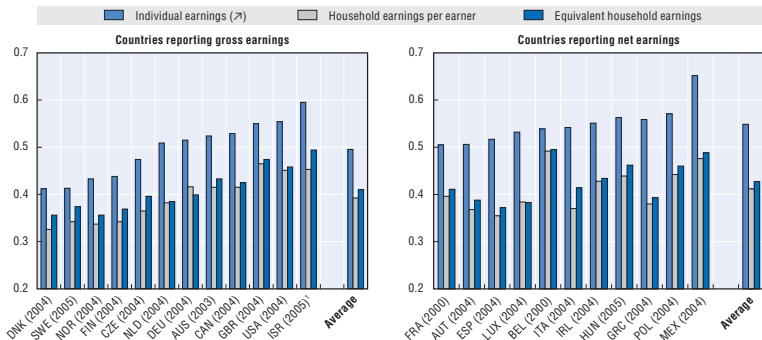
Note: Data presented on the **individual** level. Samples are restricted to all paid workers (aged 25-64) with positive wages and positive hours worked during the reference year. For Finland, hourly wage is calculated based on imputed hours worked per week. Numbers in parentheses refer to the fraction of variance of log annual earnings.

1. Hourly wage is calculated based on imputed weeks worked.

2. Hourly wage is calculated based on working 52 weeks.

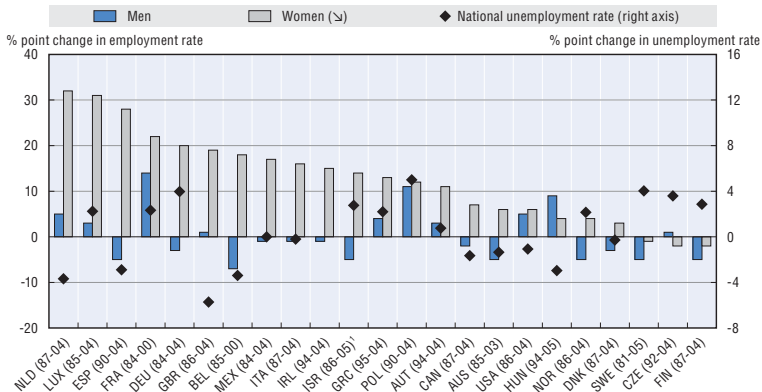
## Trends in Household Earnings Inequality: The Role of Family Formation and Assortative Mating

## Inequality (Gini coefficient) of annual earnings among individuals and households, all working-age households (including individuals and households with no earnings)



*Note:* Samples are restricted to the working-age population (25-64 years) living in a household with a working-age head. Estimates include individuals and households with no earnings. Equivalent household earnings are calculated as the sum of earnings from all household members, corrected for differences in household size with an equivalence scale (square root of household size).

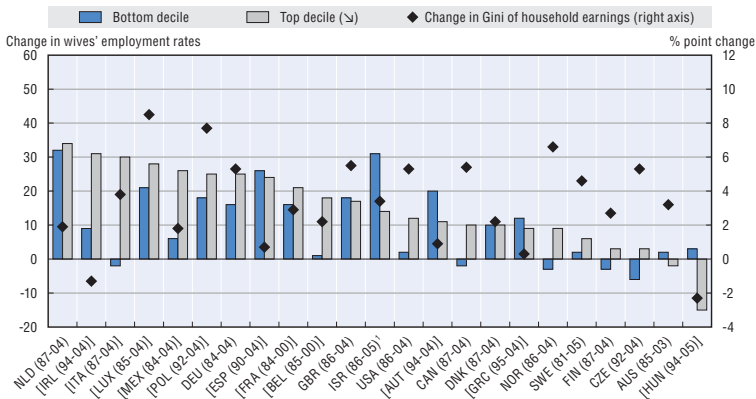
## Women's employment rates have increased markedly



*Note:* Income refers to **individual** income. Samples are restricted to the working-age population (25-64 years) living in a household with a working-age head. The shares of working men and women are calculated from the LIS data. An individual is considered as a worker if he/she has received positive amount of earnings during the reference year. Statistics for unemployment rates are drawn from the OECD Employment Database.

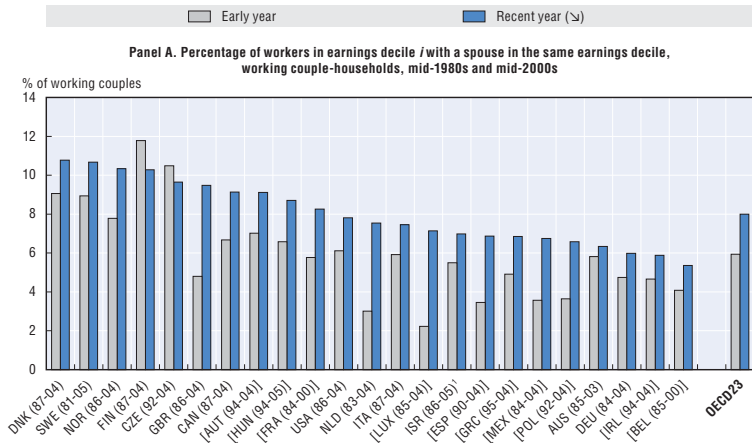
## Female employment rates increased the most among wives of top earners

Wives' employment rates by husbands' earnings (top and bottom decile), couple households, changes mid-1980s to mid-2000s



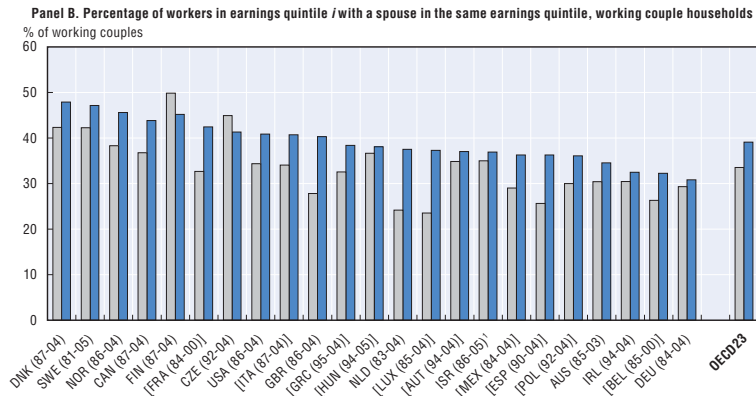
Note: Income refers to **individual** income. Sample for employment rates restricted to couple households with a working husband. Earnings refer to net earnings for countries in brackets and to gross earnings for other countries.

# Degree of assortative mating, stricter and broader definitions



*Note:* Refers to couple households with both partners working. Earnings refer to net earnings for countries in brackets and to gross earnings for other countries.

# Degree of assortative mating, stricter and broader definitions

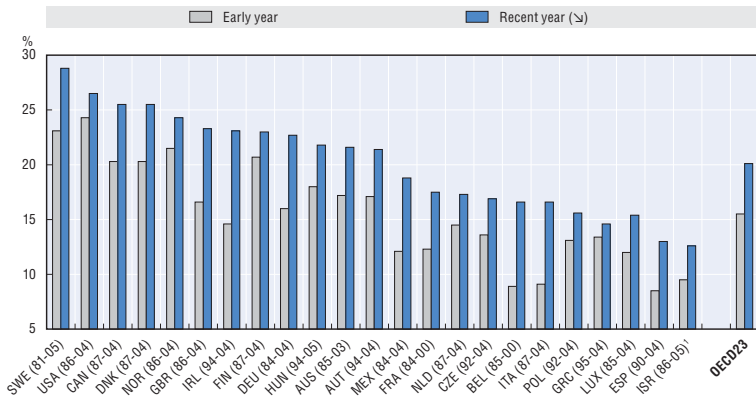


*Note:* Refers to couple households with both partners working. Earnings refer to net earnings for countries in brackets and to gross earnings for other countries.



## The share of single-headed households has increased in all OECD countries

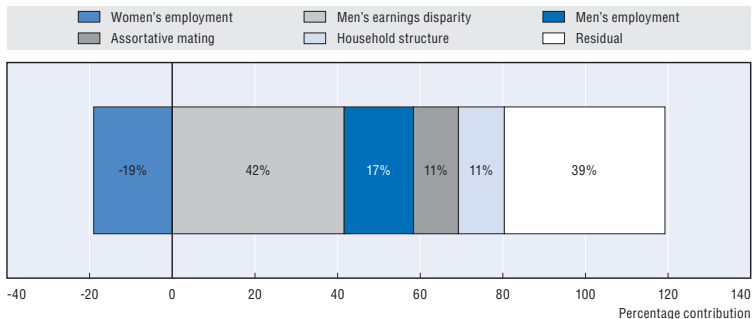
Single-headed households in percentage of all working-age households, mid-1980s and mid-2000s



Note: Single-headed households refer to single parents with children under 18, singles and singles with unrelated adults. Sample refers to all working-age households (head 25-64 years old).

## Demographic changes were less important than labour market trends in explaining changes in **household** earnings distribution

Percentage contributions to changes in household earnings inequality, OECD average, mid-1980s to mid-2000s

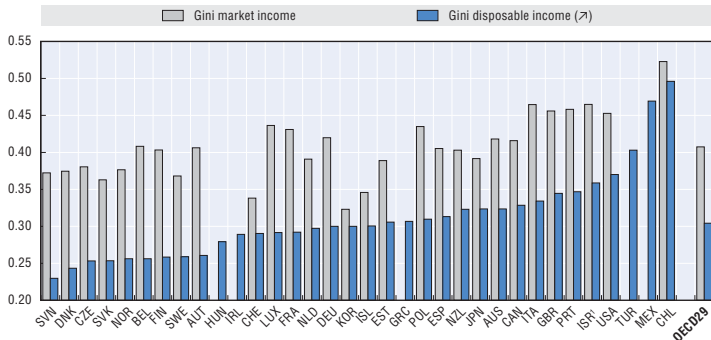


*Note:* Working-age population living in a household with a working-age head. Household earnings are calculated as the sum of earnings from all household members, corrected for differences in household size with an equivalence scale (square root of household size). Percentage contributions of estimated factors were calculated with a decomposition method which relies on the imposition of specific counterfactuals such as: "What would the distribution of earnings have been in recent year if workers' attributes had remained at their early year level?" The residual indicates the importance of unmeasured factors. These include other changes in household characteristics, such as trends in ageing or migration.

*Source:* Chapter 5, Figure 5.9.

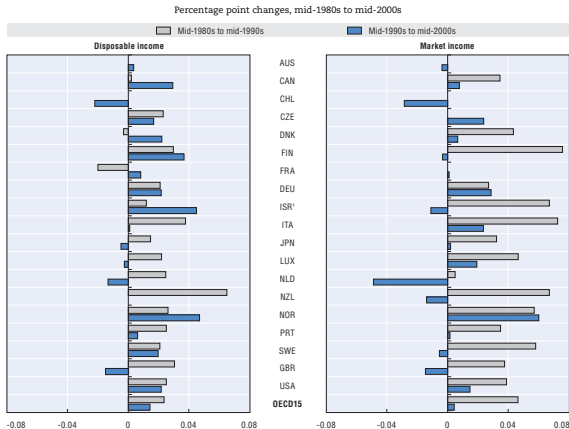
## From Household Earnings to Disposable Household Income Inequality

## Gini coefficients of inequality of market and disposable incomes, persons of working age, late 2000s



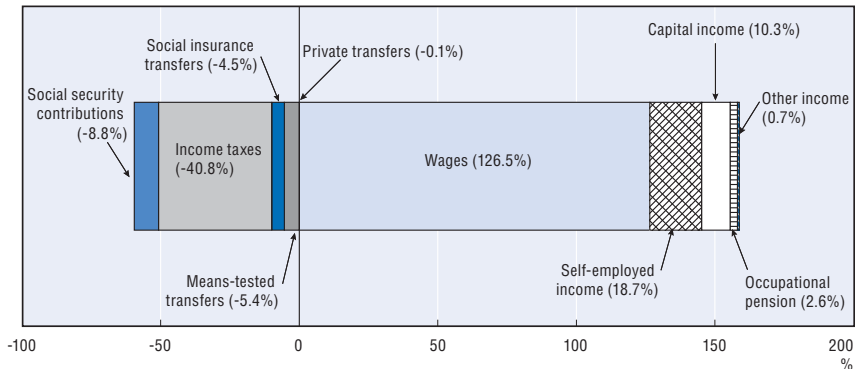
*Note:* Income refers to **household** income. Late 2000s refer to a year between 2006 and 2009. OECD average excludes Greece, Hungary, Ireland, Mexico and Turkey (no information on market income available). Working age defined as 18- to 65-years old.

## Trends in inequality of disposable and market income, working-age population



*Note:* Income refers to **household** income. OECD average excludes Australia, Chile, Czech Republic and France (no information on market income for the earlier period available). Mid-80s refer to 1990 for Czech Republic and Portugal, mid-00s refer to 2000 for Portugal. Working age is defined as 18 to 65-years old.

## Decomposition of income inequality by income source, average of 14 OECD countries, mid-2000s

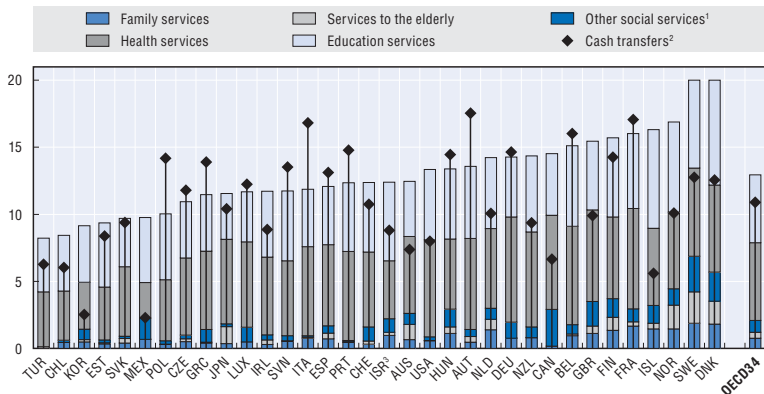


*Note:* Working-age population. Income inequality is measured by the Gini coefficient. Total Income refers to disposable household income, adjusted for household size with a square-root equivalence scale.

*Source:* OECD Secretariat calculations from the Luxembourg Income Study (LIS).

# The Distributive Impact of Publicly Provided Services

## Public expenditure for in-kind and cash transfers, in percentage of GDP, 2007



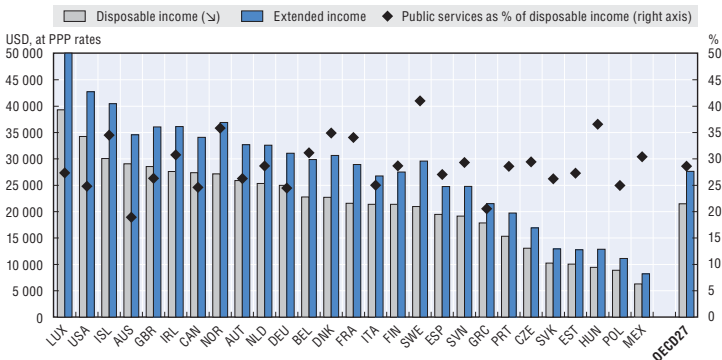
Note: Countries are ranked in increasing order of total expenditure on all social services. Data on education services for Greece, Luxembourg and Turkey refer to 2005.

1. Other social services include services to survivors, disabled persons, unemployed, as well as those in respect of housing and social assistance (estimates of social housing are, however, not included).

2. Cash transfers to the elderly, survivors, disabled persons, families, unemployed, as well as those in respect of social assistance.



# Income-increasing effect of in-kind benefits from public services, 2007



*Note:* Income data for each country are adjusted for inflation (when they refer to a year different from 2007) and then converted into USD based on PPP rates for actual consumption in 2007. This exchange rate expresses the costs of a standard basket of consumer goods and services purchased on the market or provided for free (or at subsidised rates) by the public sector in different countries.

*Source:* OECD Secretariats computations from OECD/EU database on the distributional impact of in-kind services and national survey data for non-EU countries.

## 6. Labor Supply and Selection Bias

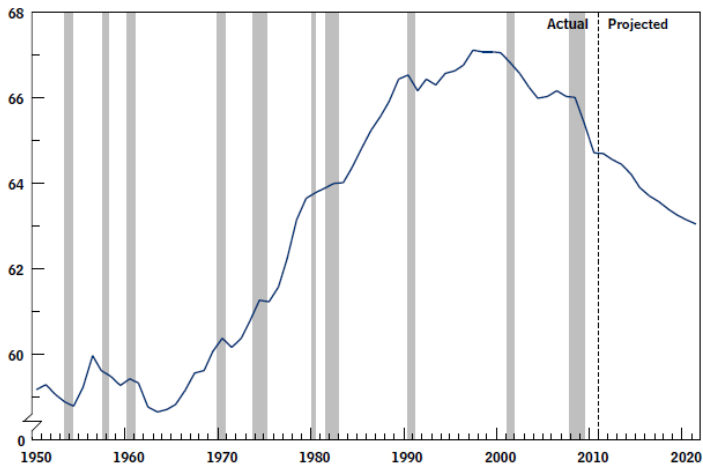
- Do Quantiles Measure Skills?

- One caveat on use of quantiles as measures of a skill distribution.
- The labor force participation rate is changing.
- The universe of definition changes.
- 90% in one year identifies different people than 90% in another year.

# Labor Force Participation

## Labor Force Participation Rate

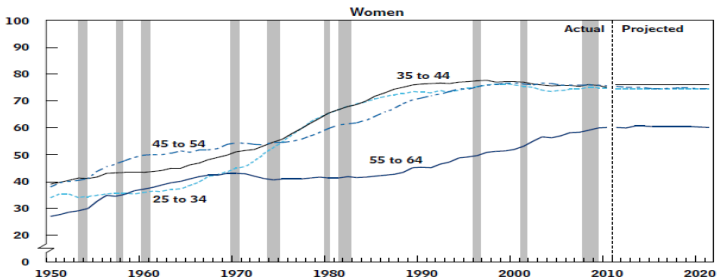
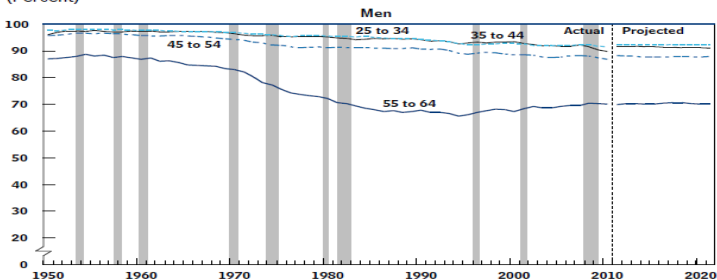
(Percent)



Sources: Congressional Budget Office; Department of Labor, Bureau of Labor Statistics.

# Labor Force Participation Rates for Men and Women, Ages 25 to 64

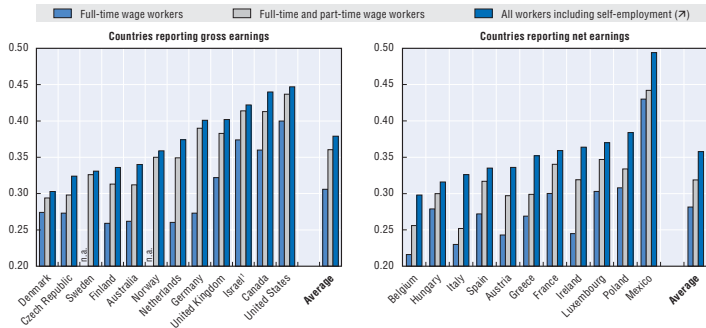
(Percent)



Sources: Congressional Budget Office; Department of Labor, Bureau of Labor Statistics.

## Levels of earnings inequality are lower when part-timers and self-employed are included

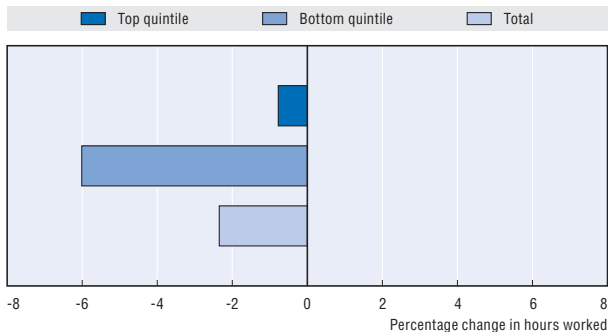
Earnings inequality (Gini coefficients) among full-timers, part-timers and all workers including the self-employed, mid-2000s



Note: Data presented on the **individual** level. Working-age individuals living in a working household. Countries are presented in increasing order of earnings inequality among all workers. Data refer to a year between 2003 and 2005, except for Belgium and France (2000).

## Hours worked declined more among lower-wage workers

Trends in annual hours worked by the bottom and top 20% of earners, OECD average, mid-1980s to mid-2000s



Note: Data presented on the **individual** level. Paid workers of working age.

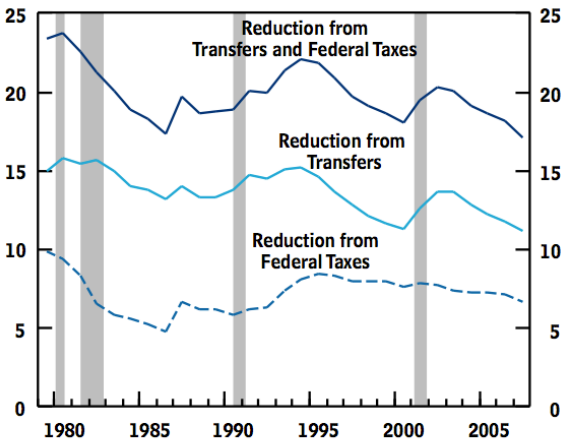
Source: Chapter 4, Figure 4.5.



## 7. Additional Discussion of Taxes and Transfers

# Reduction in Income Inequality from Transfers and Federal Taxes

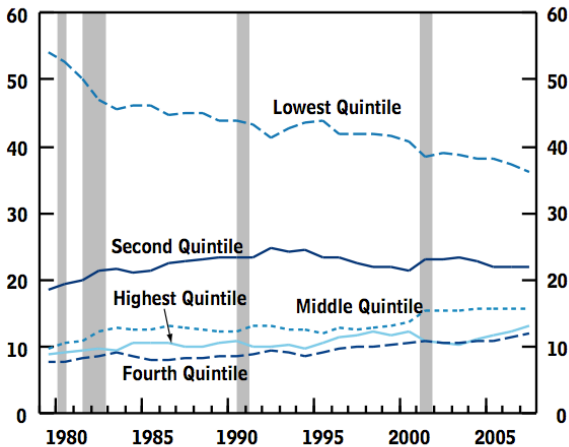
(Percentage reduction in Gini index)



Source: Congressional Budget Office.  
Income — Household Market Income.

## Share of Total Transfers, by Market Income Group

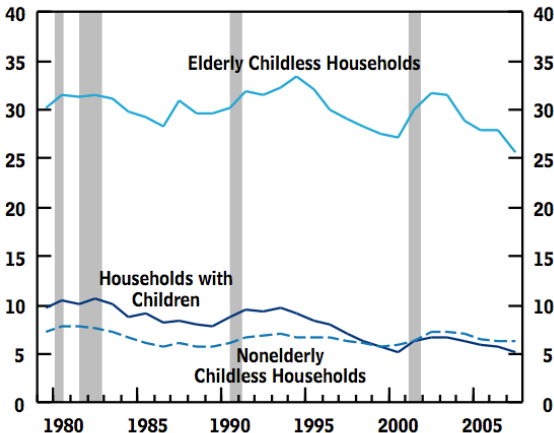
(Percent)



Source: Congressional Budget Office.

# Reduction in Income Inequality from Transfers for Different Types of Households

(Percentage reduction in the Gini index)



Source: Congressional Budget Office.

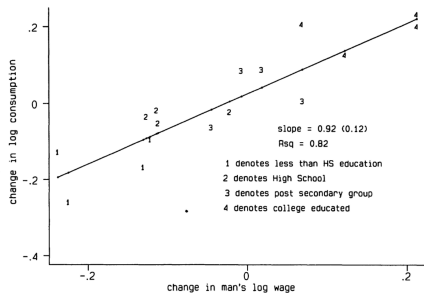
## 8. Consumption

## Consumption inequality

### Consumption as a proxy for welfare

- Inequality is usually measured in terms of earnings, wages and wealth.
- For non risk-neutral agents they are not measures of welfare.
- Moreover those do not account for taxes, transfers, social programs.
- Consumption inequality is closer to the ideal “welfare inequality”.
- However measuring consumption inequality is often difficult:
  - Many countries (US) do not have good data on consumption.
  - It is difficult to control for quality.
- And it is still imperfect: what about “leisure inequality”?

Has the increase in income inequality been matched by an equally large increase in consumption inequality?

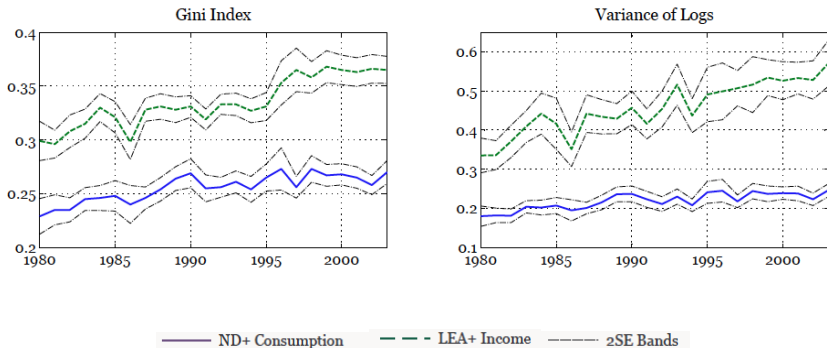


Source: Attanasio and Davis (1996)

From here we might conclude that consumption inequality follows income inequality quite closely. But the issue is controversial.

# Has the increase in income inequality been matched by an equally large increase in consumption inequality?

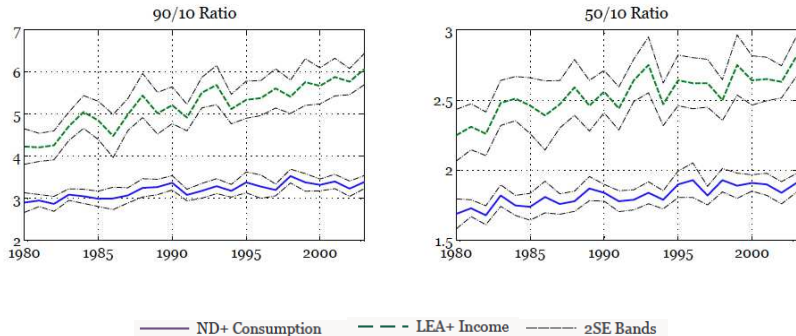
## Alternative evidence



Source: Krueger and Perri (2006). Notes: LEA is after-tax labour earnings plus transfers, i.e. the sum of wages and salaries of all household members, plus a fixed fraction of self-employment farm and nonfarm income, minus reported federal, state, and local taxes (net of refunds) and SS contributions, plus government transfers (unemployment insurance, food stamps, and welfare). Household's consumption ND+ is the sum of expenditures on nondurables, services, and small durables (such as household equipment), plus imputed services from housing and vehicles. Each expenditure component is deflated by expenditure-specific, quarter-specific consumer price indexes (CPIs).



## Has the increase in income inequality been matched by an equally large increase in consumption inequality?



Source: Krueger and Perri (2006). Notes: LEA is after-tax labour earnings plus transfers, i.e. the sum of wages and salaries of all household members, plus a fixed fraction of self-employment farm and nonfarm income, minus reported federal, state, and local taxes (net of refunds) and SS contributions, plus government transfers (unemployment insurance, food stamps, and welfare). Household's consumption ND+ is the sum of expenditures on nondurables, services, and small durables (such as household equipment), plus imputed services from housing and vehicles. Each expenditure component is deflated by expenditure-specific, quarter-specific consumer price indexes (CPIs).

## Potential causes for contradictory evidence

- **Datasets:** Consumer Expenditure Survey, Panel Study of Income Dynamics, Nielsen Homescan Data
- **Measure of consumption:** expenditures with food, non-durables, total consumption (treatment of consumer durables?)
- **Measures of income:** wages, earnings, income, including or excluding taxes and transfers
- **Measure of inequality:** 90th-10th percentile difference, variance, gini-coefficient
- **Unit under analysis:** Household “equivalized”, individual

Overall, one of the main problems is that there are no good datasets with consumption and income levels by household.

At the same time, it is important to address the role of the measurement error in income and consumption comparisons.

## Measurement error

### Sources:

- Bias in CPI (CPS-U vs. CPS-U-RS)
- Nonresponse for both income and consumption
- Under-reporting of income and some consumption items, treatment of top-coding, mean-reversion

## Measurement error

### **Can measurement error alter inequality findings?**

- Depends on whether measurement error differs across the consumption and income distributions.
  - Suppose richer households have been underreporting their income to a greater extent in recent periods (relative to the past). The rich could be increasing their expenditure more (relative to other parts of the distribution). However, the systematic measurement error could also be increasing.

How to test for group specific differences in measurement error?

## Datasets

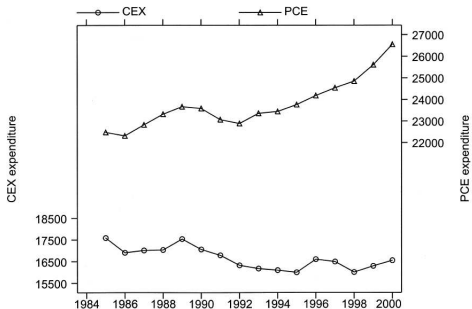
### Consumer Expenditure Survey (CEX)

- Main characteristics
  - In the past, the CEX had been conducted approximately every ten years, starting in the early 1900s and ending in 1980. Since 1980, it has been conducted on a continuous basis (repeated cross-sections).
  - Main purpose of the survey is to collect information to be used in computing the weights for the Consumer Price Index
  - It is made of two separate and independent samples:
    - Interview Survey
    - Data Survey
  - Comprehensive and detailed information about consumption expenditure and its components
    - The categories are almost exhaustive of total consumption, with the exception of personal care items
  - Also collects some income and demographic data

## Consumer Expenditure Survey

### Main problems:

- CEX does a poor job at reproducing the level of expenditure in the NIPA, and it is getting worse over time (Gerner and Maki, 2004).



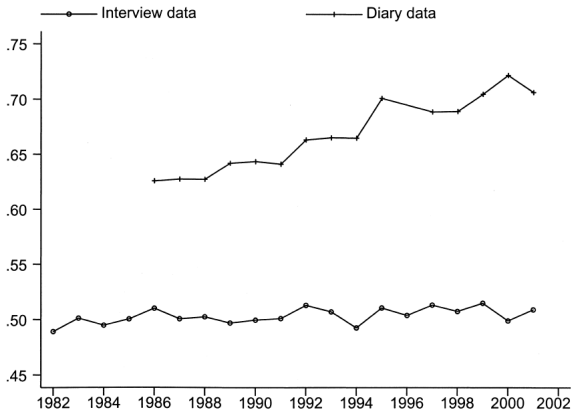
Nondurable expenditure in 2000 dollars. Reproduced from (Attanasio Battistin and Ichimura, 2007)

## Ratio of CEX to PEC for comparable categories

Year	All	Durable	Nondurable	Owned housing	Other services
1992	.88	.88	.69	1.23	.90
1997	.88	.80	.67	1.26	.86
2002	.84	.75	.63	1.25	.82
2003	.82	.79	.61	1.26	.80
2005	.83	.75	.63	1.26	.81
2007	.81	.69	.61	1.30	.81

Reproduced from Garner, McClelland and Passero (2009)

- Interview data and Diary data have different implications in terms of evolution of consumption inequality over time (Attanasio, Battistin and Ichimura, 2007; Bee, Meyer and Sullivan (2012))



Standard Deviation of log per capita monthly expenditure. Reproduced from (Attanasio Battistin and Ichimura, 2007)



- Higher income households are increasingly likely to underreport their expenditures relative to lower income (Aguiar and Bilis, 2011)

	(1)	(2)	(3)	(4)
Relative Mis-Measurement 1980–1982				
High Income – Low Income	0.13 ( 0.07)	0.10 ( 0.05)	0.10 ( 0.05)	0.08 ( 0.05)
Change 1980/82–1991/93	-0.17 ( 0.08)	-0.12 ( 0.06)	-0.11 ( 0.06)	-0.10 ( 0.06)
Change 1980/82–2005/07	-0.35 ( 0.08)	-0.24 ( 0.07)	-0.23 ( 0.07)	-0.16 ( 0.06)
Change 2005/07–2008/10	0.06 ( 0.07)	0.03 ( 0.06)	0.04 ( 0.05)	0.00 ( 0.04)
Categories Included	All	All	Without durables	All
Specification	OLS	GLS	GLS	WLS (NIPA Shares)

Note: This table reports the change in the estimated income-specific measurement error for high-income respondents relative to low-income respondents:  $\phi^5 - \phi^1$  from equation (6). The specification for each column is the same as in table 3. The first row is the level for the period 1980–82, and the next three rows report the change over the indicated period. Standard errors are calculated using a bootstrap with 500 replications.

- On top of the problems capturing expenditure levels, there is also evidence that CEX does not capture as much income as other surveys. For example, the CEX aggregate income is in average only 94 per cent of CPS aggregate income (Passero, 2009), whereas the CPS also under-reports based on NIPA. This may be because high-income CEX households are less likely to report their income accurately and/or the very top of income distribution are under-represented in the CEX.

## Other datasets

### Panel Study of Income Dynamics

- Main characteristics:
  - Longitudinal survey
  - Starts in late 1960s
  - Very good income and demographics
  - Also collects information on consumption
  - Until 1997, only food expenditure is available.  
Housing/utilities (most of the time)
  - After 1997, broader measures are collected, covering now 70% of total CEX spending.
- Main problems:
  - Only limited coverage of spending categories (until 1997 only food, after 1997, around 70% of total expenditures)
  - Growth in non-response

# Summary of contributions by the literature

	Data source	Time Period	Sample	Deflator	Data and adjustments	Methodology and contribution	Main results
<b>Cutler and Katz (1991)</b>	CEX Interview Survey for 1960-61, 1972-73, 1980, 1984 and 1988. (CPS for income)	1960s, 1970s and 1980s	The Cex survey has several modifications and the sample selection changes. Different sub-samples were considered to test for robustness.	CPI and PCE	Two measures of consumption: total expenditures (except indirect purchases, such as fringe benefits), and total consumption, i.e. total expenditure, minus spending on insurance, pensions, and SS, and minus owned houses and vehicles, plus imputed rents.	Explore consumption (by looking at total expenditure and out-of-pocket expenditures) and other measures of the disadvantaged individuals and families (those in the lower part of the income distribution)	The distribution of cons. is more equally distributed than income. Consumption ineq. was greatly reduced from the early 1960s to the early 1970s, and then increased in the 1970s and 1980s.
<b>Attanasio and Davis (1994, 1996)</b>	CEX Interview Survey (CPS for income)	1980-1990	CEX: Include HH head male 23-59. Exclude non-urban, residing in a student housing. CPI: exclude students, military, self-employed, <75% minimum wage. Imputation methods are used	CEX: Expenditure-specific, group-specific CPIs. CPI: GDP.	Consumption measure equals household expenditures on nondurable goods and services. Exclude expenditure on durables, health, education, and housing. Hourly earnings are computed as annual earnings divided by the product of weeks worked and usual hours per week.	Focus on differences across education and year of birth cohorts (i.e. it does not account for intra-cohort inequality). Looks at household expenditures on nondurable goods and services (exclude expenditure on durables, health, education, and housing)	Using measures of between groups inequality, the main conclusion is that relative wage changes are reflected in relative consumption changes.
<b>Slesnick (2001)</b>	CEX and Personal Consumption		Up through 1995. CEX starting in 1980, the PCE starting as early at 1948	CPI, CPI-X (an experimental CPI) and the PCE index.	Used share-based Engle curves to argue that consumer welfare has been improving. Nutritional and Equivalence Scales (such as by Deaton and Muellbauer 1980) and subjective equivalence scales.	1) compares inflation of CPI and other possibly superior inflation indexes. 2) infers from consumption shares of food and other goods that real income has increased (Engle 1895) 3) Adjusts HH income via adult-equivalent scales (taking into account a decrease in family size) 4) Measures inequality using the logarithm of per equivalent consumption as the measure of HH welfare (that is, adjusting for HH size).	Standard of Living indexes using the CPI deflator are biased downward. The biggest bias took place from 1973-1983. Accounting for per equivalent consumption implies that inequality decreased from 1950 to 1970 and remained flat thereafter.

	Data source	Time Period	Sample	Deflator	Data and adjustments	Methodology and contribution	Main results
<b>Krueger and Perri (2006)</b>	CEX Interview and Survey	1980-2003	Complete HH income respondents. Alternative samples are considered (e.g. excluding elderly and rural households)	Expenditure-specific, quarter-specific CPIs	Income is defined as a sum of wages and salaries, plus a fraction of self-employment income, minus taxes and SS contributions. Consumption is the sum of exp. on nondurables, services, and small durables, plus imputed services from housing and vehicles. Income and consumption is divided by the # of adult equivalents.	1) Compares the cross-sectional income and consumption distributions and computes inequality measures. 2) Explores theoretical models. 3) Assess whether the model is quantitatively consistent with the observed trends for within- and between- group consumption inequality.	The main finding is that consumption inequality increased only moderately (consistent across measures), while income inequality increased substantially, specially at the top of the income distribution. The theoretical models considered understate and overstate consumption inequality depending on the assumptions used.
<b>Attanasio, Battistin and Ichimura (2007)</b>	CEX Interview and Diary samples (CPS for income)	1982-2001	Head HH 25 to 60 and not self-employed (and complete income observations for some exercises). Data is trimmed at the 1st and 99th percentiles of expenditure distribution.	CPI quarter-specific	Consumption is measured focusing on the expenditure on non-durable goods and services. Excludes consumption on durables, health, education as well as mortgages and rent payments. Uses OECD's adult equivalence scale .	Combines the two CEX samples. For each category of expenditure, one of the two sources is selected (using subjective information). With some additional assumptions estimates the cross sectional variance.	Consumption inequality (at individual level, measured by the variance) increased by around 5.4 percent over the 1990s.

	Data source	Time Period	Sample	Deflator	Data and adjustments	Methodology and contribution	Main results		
	<b>Aguiar and Bils (2012)</b>	CEX Interview Survey	1980-2010		Head HH 25 to 64. Exclude non-urban, if skip interviews, if "incomplete" income reporter, if spend > 1/2 after-tax income on any category (no food and vehicle), top and bottom 5% to mitigate top coding problems	CPI-U	Income and expenditure at HH level. Include expenditure for food and rental equivalence. Food at home increased by 11% in 1982-1987. Savings data adjusted for mortgages related to refinancing (does not affect C-ineq).	Incorporates measurement error and defines a robust procedure that measures consumption inequality by looking at how high - versus low-income households allocate spending towards luxuries versus necessities. Measure 1: income - adjusted savings. Measure 2: consumption expenditures from demand system correcting for multiplicative measurement error: term for good specific and income	Estimates point that consumption inequality (at HH level but controlling for HH characteristics) increased by close to 30 percent between 1980 and 2010: around 20 percent until 1993, 13 percent from 1993 to 2007, a small reduction in the last 3 years.
	<b>Attanasio, Hurst and Pistaferri (2012)</b>	CEX Interview and Diary samples, PSID	1980-2010		Head HH 25 to 64. Exclude non-urban, if "incomplete" income reporter.	CPI-U; CPI food	CEX. Nondurable consumption HH equalized. Exclude expenditure on health and education, interest on loans and mortgages, contributions to charities. PSID.	Studies expenditure categories well measured in the CEX-interview, and CEX-diary and scale the measures of cons. to account for measurement error. Construct new measures of ineq. by looking at measures of stock of cars. Use PSID to measure cons. ineq.	Depending on the sample and measure of expenditure, the estimates of the increase in the st.dev of log cons. ranged between 0.15 and 0.2 log points between 1980 and late 2000s.
	<b>Meyer and Sullivan (October, 2012)</b>	Annual Social and Economic (ASEC), CPS and CEX	1960-2010		CEX from 1960-1961, 1972-1973, 1980-1981, and 1984-2010. 200K households annually in CPS.	Compares CPI-U based official methods of poverty with alternatives.	Adjust consumption data to account for flows from stocks. Account for transfers and taxes.	Refine consumption data -> convert vehicle spending to service flow equivalent; convert housing expenditures to housing consumption flows; impute rental value of government or subsidized housing; exclude spending that is better interpreted as investment (education and health care and retirement savings). Construct poverty measures that take into account transfers, as well counting co-habiting partners as members of the same household. Official measures overstate poverty and understate reductions in poverty. Demographic changes other than increased education explain only a small share of change in poverty since 1960's.	1) Confirm upward bias in CPI-U, the index used to adjust official poverty thresholds for inflation. 2) Using measures for consumption that include the EITC and Child Credit, food stamps, housing benefits, and other transfers show a faster declining poverty over time. 3) Measuring consumption of families directly 4) attribute changes in poverty to changes in government policy.

## Attanasio, Hurst and Pistaferri (2012)

### Contributions

- Use multiple datasets (in particular the CEX Diary survey, Interview data and the PSID) to check consistency of estimates
- Correct for the non-classical measurement error (potentially correlated to income, expenditure categories and demographics characteristics) in CE data
  - Focus on consumption categories that were documented as well measured (Meyer and Sullivan 2012, Gerner and Maki 2004)
  - Take a stand on the nature of measurement error
- Crucially, use a log linear demand system to impute total consumption using PSID

## Attanasio, Hurst and Pistaferri (2012)

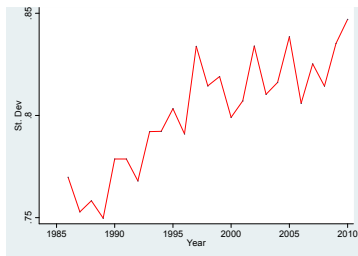
### Samples

- CEX sample
  - Contains households of urban areas, whose respondents are aged between 25 and 65.
  - Households that did not answer all 4 surveys are excluded. [Notice that this may create attrition bias]
- PSID sample
  - Contains households whose respondents are aged between 25 and 65.
  - Exclude the Latino sub-sample and keep the SEO subsample
  - Exclude observations with outlier records in income and food consumption.

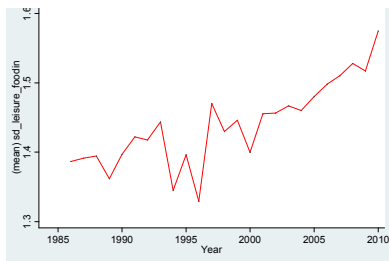


## Attanasio, Hurst and Pistaferri (2012)

Observed SD of log “equivalized”  
Non-durable consumption  
Diary Data

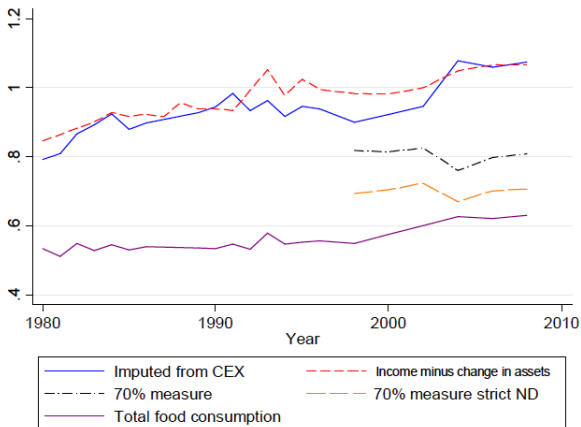


Estimated SD of log ratio of  
Entertainment/Food spending  
Diary Data



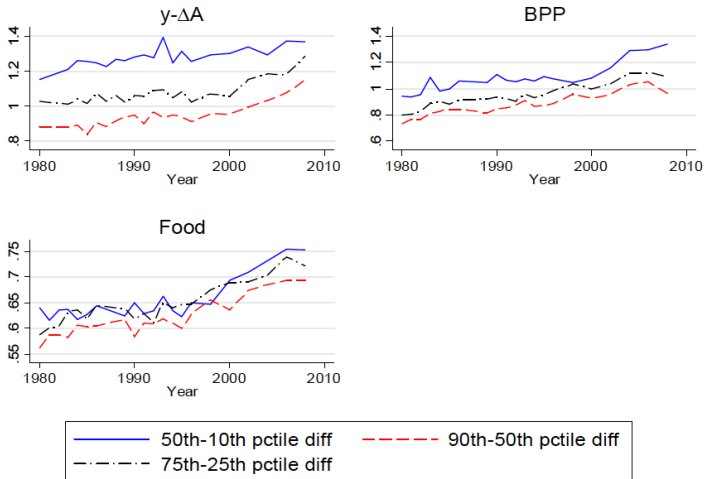
According to Aguiar and Bils (2012)  $\alpha_1 - \alpha_2 = 1.4$ . Instead, according to the estimates in Lechene and Levell (2012) no adjustment is needed as  $\alpha_1 - \alpha_2 = 1$ .

## Attanasio, Hurst and Pistaferri (2012)



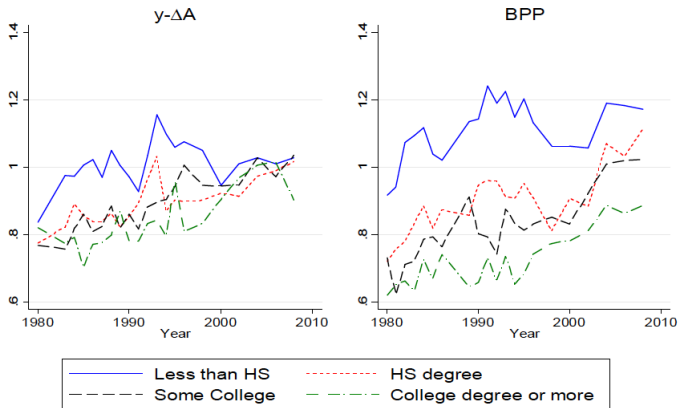
Notes: — Imputed total consumption using BPP's procedure, - - - Imputed total consumption using Ziliak's procedure. - - - - - Observed consumption categories available post-1997. - - - - - Observed consumption categories available post-1997, except expenditures with health and education. — Observed food consumption.

## Attanasio, Hurst and Pistaferri (2012)



Notes: (top right) Imputed using BPP's procedure, (top left) Imputed using Ziliak's procedure, (bottom) Observed food consumption.

## Attanasio, Hurst and Pistaferri (2012)

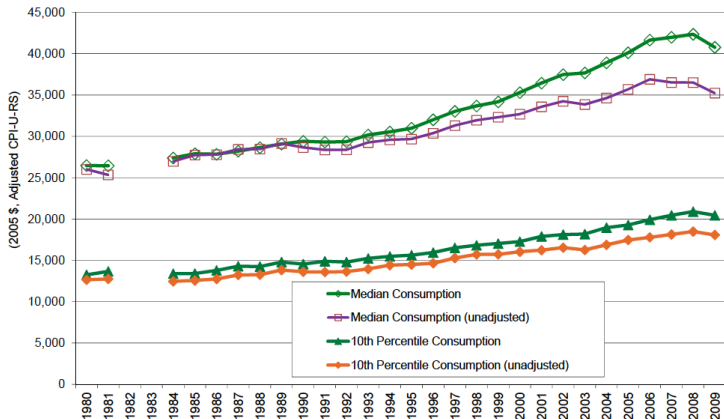


Notes: (right) Imputed using BPP's procedure, (left) Imputed using Ziliak's procedure.

## Meyer and Sullivan (2011)

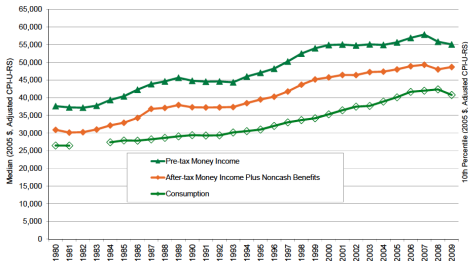
- Construct income series correcting for biases in price deflator
- Account for the role of taxes and transfers
- Correct CE Survey consumption measures accounting for durables and misreporting

## Meyer and Sullivan (2011)

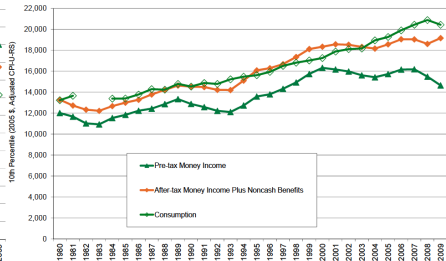


Notes: Authors calculations using CEX. All measures are reported in 2005 dollars using adjusted CPI-U-RS, are calculated at the family level, are person weighted, and are adjusted for differences in family size using the NAS recommended equivalence scale. Each scale adjusted measure is multiplied by 2.14, the mean adult equivalent value across all years. The consumption excluded MOOP, education and retirement spending.

# Meyer and Sullivan (2011)



## Median

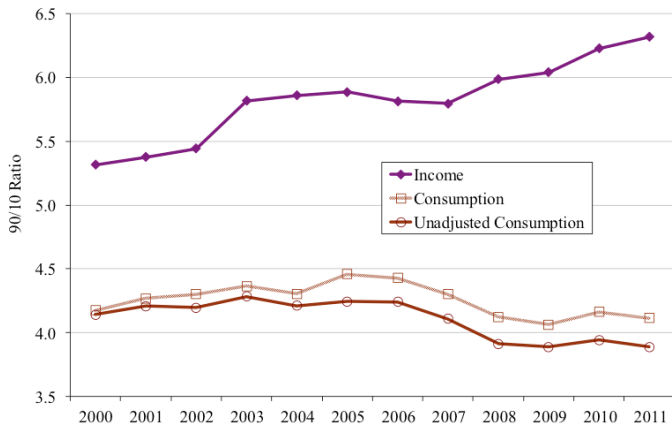


## 10th Percentile

Notes: Authors calculations using CEX and CPS. All measures are reported in 2005 dollars using adjusted CPI-U-RS, are calculated at the family level, are person weighted, and are adjusted for differences in family size using the NAS recommended equivalence scale. Each scale adjusted measure is multiplied by 2.14, the mean adult equivalent value across all years. The consumption excluded MOOP, education and retirement spending. Non-cash benefits include food stamps and housing and school lunch subsidies.

Meyer and Sullivan (2013)

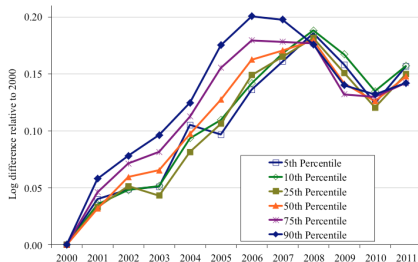
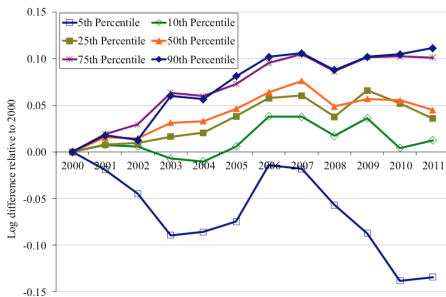
## Consumption and Income Inequality and the Great Recession



Note: Income is after-tax money income plus food stamps and housing and school lunch subsidies. Consumption is adjusted for under-reporting by calculating a predicted value of consumption from a regression of unadjusted consumption on core consumption and demographic characteristics using data from 1980 and 1981.



## Meyer and Sullivan (2013)



## Real Changes in income (left) and Consumption (right) at various percentiles

Note: Income is after-tax money income plus food stamps and housing and school lunch subsidies. Figures are adjusted for inflation using the adjusted CPI-U-RS. Consumption is adjusted for under-reporting by calculating a predicted value of consumption from a regression of unadjusted consumption on core consumption and demographic characteristics using data from 1980 and 1981. See text for more details. Figures are adjusted for inflation using the adjusted CPI-U-RS.

## A “Second Opinion” on The Economic Health of The American Middle Class

Richard V. Burkhauser, Jeff Larrimore, and Kosali I. Simon

- **Have middle class American failed to benefit from economic growth over the past three business cycles?**
- Inflation-adjusted income of middle class households as measured by median household income has fallen during economic downturns and risen with recovery within all business cycles, yearly gains have historically more than offset yearly losses so that it has risen from peak-to-peak over each business cycle. (CPS data)
- There is evidence that the fraction of market income going to the top 10 percent of tax units is at its highest level since at least 1917. (IRS administrative records by Piketty and Saez (2003) and Saez (2009))
- Together, these findings suggest that the middle class is not sharing proportionately in the fruits of American economic growth (see, e.g., Johnson 2007, Piketty and Saez 2007, Goldman 2008, Lahart and Evans 2008, Leonhardt 2008).

## What data was used in previous papers? Two main data sources:

### - IRS tax record data:

- data on tax units, i.e. group of individuals who file a tax return together and their child dependents.
- Contains information on the pre-tax, pre-transfer cash income

### - Annual March CPS:

- Data on households
- Contains pre-tax, post-transfer cash income excluding capital gains. Also includes the value of all public transfers (including welfare, Social Security, and other government provided cash assistance), much of which is not taxable.

The **distinctions between tax units and households** as sharing units or between the **resources counted within them as income** are not trivial but the evidence using these two sources are often viewed interchangeably.

## Sharing units

- A tax unit typically consists of an adult, his or her spouse, and any dependent children. In a “traditional family arrangement,” a tax unit would be “equivalent” to household. However, there are increasingly exceptions to such traditional households. For example, cohabiters, roommates who share expenses, children who move back in with their parents or older parents who live with their adult children will contain more than one tax unit.
- This paper shows that the choice of sharing unit and which of its resources are counted will make a substantive difference in measures of the resources available to middle class Americans, as will controlling for the number of people in the sharing unit.

**Table 1: Comparing the total growth from 1979-2007 using each sharing unit, size-adjustment, and income series combination.**

	Tax Unit	Household	Size-Adjusted Tax Unit	Size-Adjusted Household
Pre-tax, pre-transfer	3.2%	12.5%	14.5%	20.6%
Pre-tax, post-transfer	6.0%	15.2%	17.0%	23.6%
Post-tax, post-transfer	9.5%	20.2%	25.0%	29.3%
Post-tax, post-transfer + Health Insurance	18.2%	27.3%	33.0%	36.7%

Source: Public Use March CPS data.

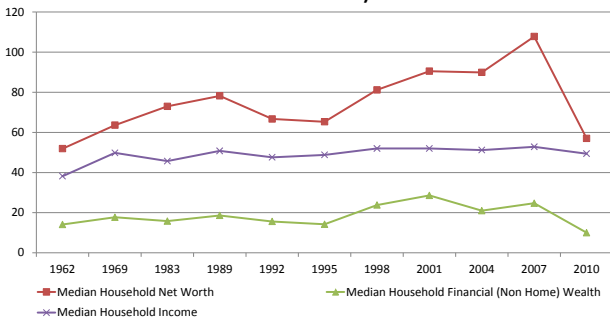
Note: Changes in income between 1992 and 1993 are suppressed and assumed to be zero given the trend-break resulting from the CPS redesign in those years. See main text for details.

<sup>1</sup> Health insurance information not available prior to 1988. The rate of growth in the value of health insurance from 1979-1989 is assumed to match that of post-tax, post-transfer income.

# Wealth Inequality



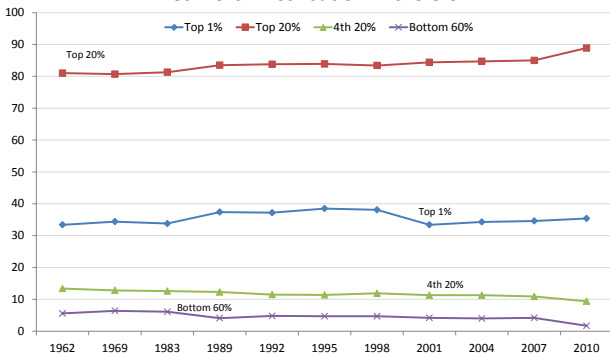
## Median Household Wealth and Income (In thousands, 2010 dollars)



Source: Wolff (2012)

Note: Financial (Non home wealth) is defined as net worth minus net equity in owner-occupied housing (the primary residence only). Non-home wealth is a more liquid concept than marketable wealth, since one's home is difficult to convert into cash in the short term. Net worth is defined as the current value of all marketable or fungible assets less the current value of debts.

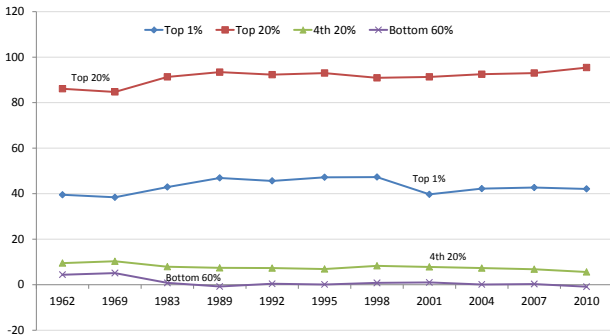
## Net Worth Distribution in the U.S.



Source: Wolff (2012)

Note: Net worth is defined as the current value of all marketable or fungible assets less the current value of debts.

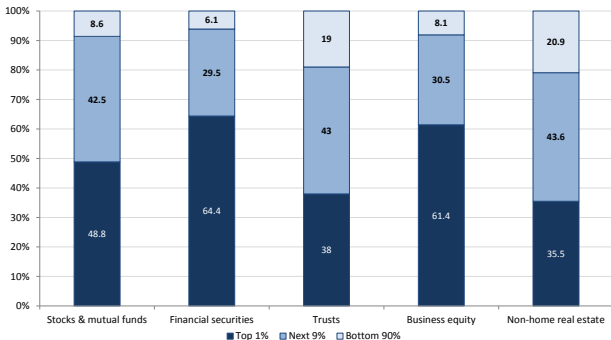
## Financial Wealth Distribution in the U.S.



Source: Wolff (2012)

Note: Financial (Non home wealth) is defined as net worth minus net equity in owner-occupied housing (the primary residence only). Non-home wealth is a more liquid concept than marketable wealth, since one's home is difficult to convert into cash in the short term. Net worth is defined as the current value of all marketable or fungible assets less the current value of debts.

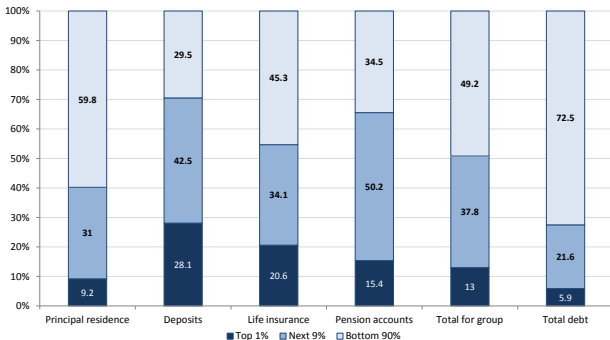
## Wealth Distribution by Type of Asset, US 2010: Investment Assets



Source: Wolff (2012)

Note: Households are classified into wealth class according to their net worth

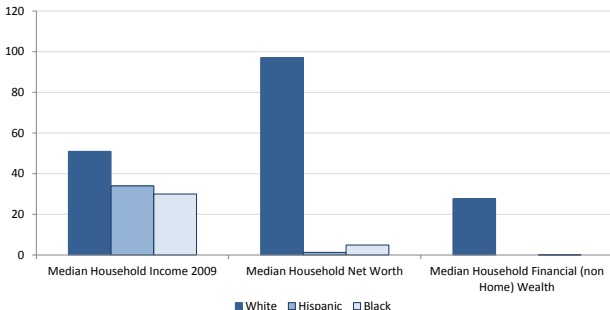
## Wealth Distribution by Type of Asset, US 2010: Other Assets



Source: Wolff (2012)

Note: Households are classified into wealth class according to their net worth

## Household Income and Wealth by Race, 2009/2010 (In thousands, 2010 dollars)



Source: Wolff (2012)

Note: Financial (Non home wealth) is defined as net worth minus net equity in owner-occupied housing (the primary residence only). Non-home wealth is a more liquid concept than marketable wealth, since one's home is difficult to convert into cash in the short term. Net worth is defined as the current value of all marketable or fungible assets less the current value of debts.

# Consumption and Wealth inequality: International Comparison

## Long-Run Changes in Inequality

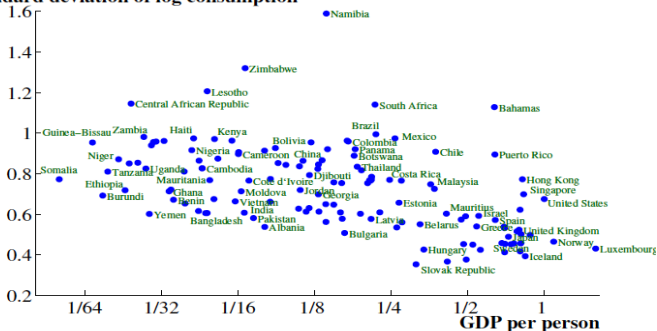
Country	Bottom (50/10)			Top (90/50)			Period
	Disp. inc.	Cons.	Gap	Disp. inc.	Cons.	Gap	
Canada	0.38	0.20	0.18	0.10	0.07	0.03	1978–2006
Germany	0.35	0.00	0.35	0.15	0.10	0.05	1983–2003
Italy	0.22	0.09	0.13	0.05	0.01	0.04	1980–2006
Mexico	5.81	0.80	5.01	1.12	1.08	0.04	1989–2002
Russia	0.10	0.05	0.05	−0.16	−0.10	−0.06	1994–2005
Spain	−0.16	−0.13	−0.03	−0.18	0.01	−0.17	1985–1996
Sweden	0.13	0.02	0.11	0.21	0.10	0.11	1985–1998
UK	0.86	0.58	0.28	0.27	0.12	0.15	1978–2005
USA	0.55	0.25	0.30	0.40	0.15	0.25	1980–2006
<b>Average</b>	<b>0.91</b>	<b>0.21</b>	<b>0.71</b>	<b>0.22</b>	<b>0.17</b>	<b>0.05</b>	

Source: Krueger, Perri, Pistaferri and Violante (2010)



## Within-country Inequality

Standard deviation of log consumption



Note: The standard deviation of log consumption within each economy is inferred from Gini coefficients taken from the World Income Inequality Database, Version 2.0c.

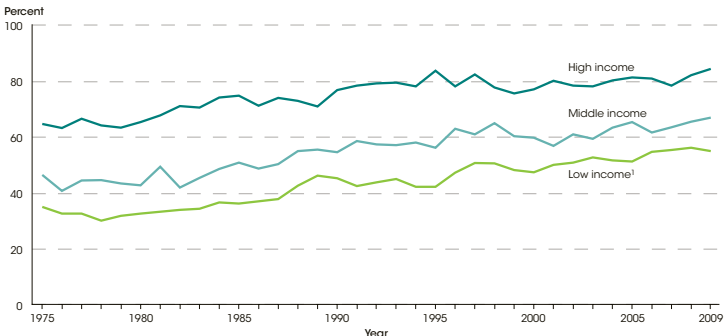
Source: Jones and Klenow (2010, WP-NBER). Data for the period 1990-2006.

## 9. Family as a Source of Inequality

- What is the role of the family?
- Mechanisms of the family influence.
  - income?
  - genes?
  - parenting environments?

- Family income and its ambiguous role.
- What is the role of the family in explaining these trends and sluggish responses?
- What is the true set of constraints governing the family?

## Percentage of high school completers who were enrolled in 2- or 4-year colleges the October immediately following high school completion, by family income: 1975–2009



<sup>1</sup> Due to the small sample size for the low-income category, data are subject to relatively large sampling errors. Therefore, moving averages are used to produce more stable estimates. The 3-year moving average is an arithmetic average of the year indicated, the year immediately preceding, and the year immediately following. For 1975 and 2009, a 2-year moving average is used: data for 1975 reflect an average of 1975 and 1976, and data for 2009 reflect an average of 2008 and 2009.

NOTE: Includes high school completers ages 16–24, who account for about 98 percent of all high school completers in a given year. *Low income* refers to the bottom 20 percent of all family incomes, *high income* refers to the top 20 percent of all family incomes, and *middle income* refers to the 60 percent in between. For more information on the Current Population Survey (CPS), educational attainment, and family income, see *supplemental note 2*.

SOURCE: U.S. Department of Commerce, Census Bureau, Current Population Survey (CPS), October Supplement, 1975–2009.

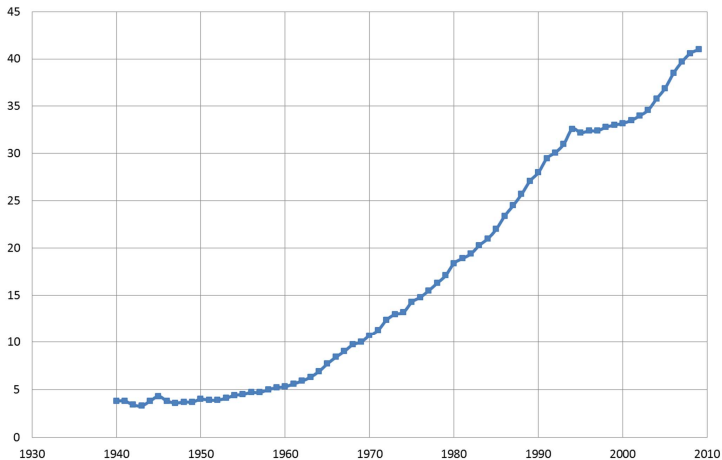
## Proportion of Students from Families in Each Income Quartile Who Enroll in Postsecondary Schools Within 20 Months of High School Graduation

Parental Income Quartile	Any Postsecondary Schooling:			
	<i>Total</i>	Vocational, Technical	2-Year College	4-Year College
Class of 1980/82				
Bottom	<i>0.57</i>	0.12	0.16	0.29
3rd	<i>0.63</i>	0.11	0.19	0.33
2nd	<i>0.71</i>	0.10	0.22	0.39
Top	<i>0.80</i>	0.06	0.19	0.55
Total:	<i>0.68</i>	0.10	0.19	0.39
Class of 1992				
Bottom	<i>0.60</i>	0.10	0.22	0.28
3rd	<i>0.70</i>	0.07	0.25	0.38
2nd	<i>0.79</i>	0.06	0.25	0.48
Top	<i>0.90</i>	0.05	0.19	0.66
Total:	<i>0.75</i>	0.07	0.23	0.45

Note: Based upon tabulations of the High School and Beyond Survey and National Education Longitudinal Study of 1992. Parental income was reported by parents. Figures were reported in Ellwood and Kane (2000).

## Inequality in Family Environments

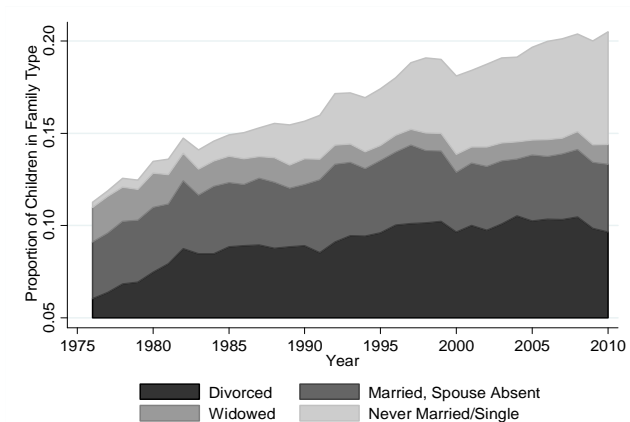
## Percent of births to unmarried women: United States



Source: Center for Disease Control and Prevention; Note: For the period 1940-1950 on 1940 and 1950 birth rates are presented; Age of mother 15-44

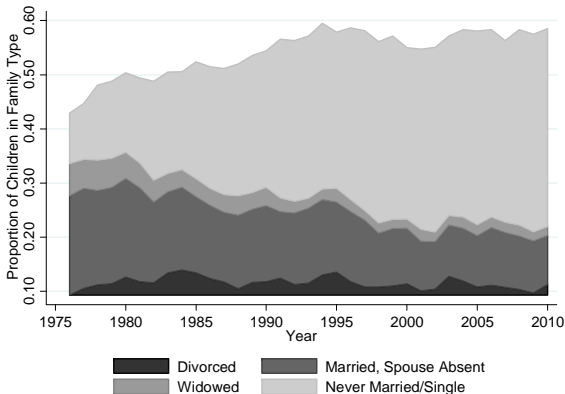


### Children Under 18 Living in Single Parent Households by Parent Marital Status ( White Non Hispanic Parents )



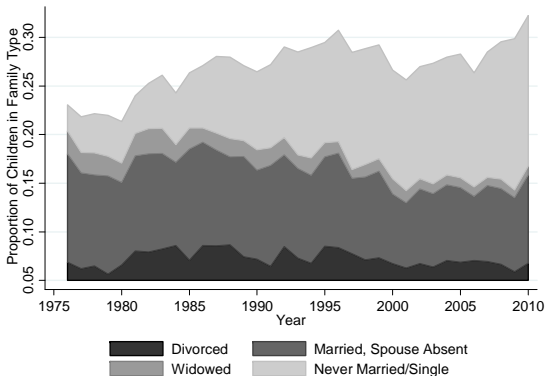
Source: March CPS 1976-2010; Note: Source: March CPS 1976-2010. Note: Parents are defined as the head of the household. Children are defined as individuals under 18, living in the household, and the child of the head of household. Children who have been married or are not living with their parents are excluded from the calculation. Separated parents are included in "Married, Spouse Absent" Category

## Children Under 18 Living in Single Parent Households by Marital Status and Race of Parent, ( Black Non Hispanic Parents )



Source: March CPS 1976-2010; Note: Source: March CPS 1976-2010. Note: Parents are defined as the head of the household. Children are defined as individuals under 18, living in the household, and the child of the head of household. Children who have been married or are not living with their parents are excluded from the calculation. Separated parents are included in "Married, Spouse Absent" Category

## Children Under 18 Living in Single Parent Households by Parent Marital Status (Hispanic Parents)



Source: March CPS 1976-2010; Note: Source: March CPS 1976-2010. Note: Parents are defined as the head of the household. Children are defined as individuals under 18, living in the household, and the child of the head of household. Children who have been married or are not living with their parents are excluded from the calculation. Separated parents are included in "Married, Spouse Absent" Category

# Intergenerational Transmission of Family Influence

# “Analyzing Income Mobility Over Generations” (Mazumder, 2002)

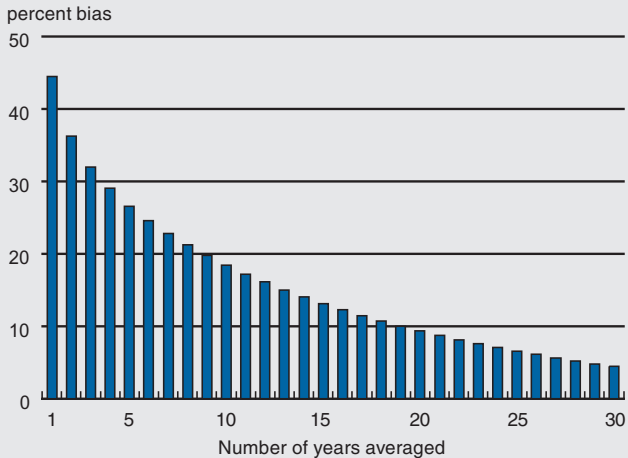
## Intergenerational Correlations

- Lifetime inequality measures (Paglin, 1978). “g” represents a generation.

$$\underbrace{y_{g+1}}_{\text{Income of Child}} = \alpha + \underbrace{\beta y_g}_{\text{Income of Parent}} + U_g$$

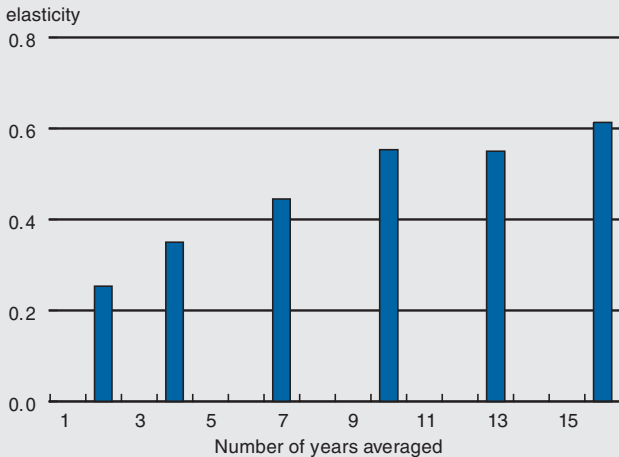
- Bias-matching: what ages used
- $\beta$  trends upward as ages matched agree and use more years.

# 1. Implied bias in intergenerational elasticity



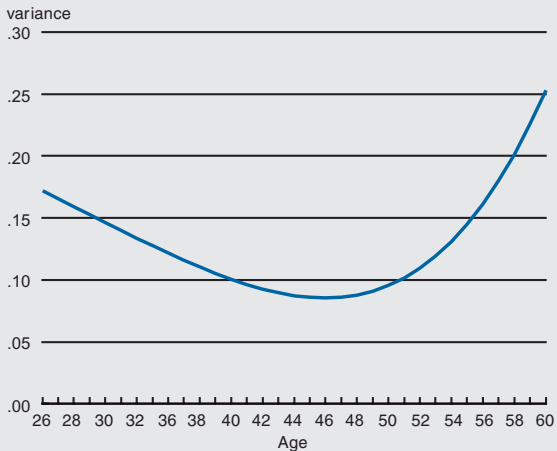
NOTE: Number of years averaged is the number of years used to average the father's earnings.

## 2. Estimated intergenerational elasticity



NOTE: Number of years averaged is the number of years used to average the father's earnings.

### 3. Lifecycle pattern of variance of transitory shocks



NOTE: Variance is the variance of transitory shocks to log earnings.



Table 1: Elasticity and correlations from Jäntti et al. (2006)

Country	Elasticity	Correlation
<b>Men</b>		
Denmark	0.071 [0.064, 0.079]	0.089 [0.079, 0.099]
Finland	0.173 [0.135, 0.211]	0.157 [0.128, 0.186]
Norway	0.155 [0.137, 0.174]	0.138 [0.123, 0.152]
Sweden	0.258 [0.234, 0.281]	0.141 [0.129, 0.152]
UK	0.306 [0.242, 0.370]	0.198 [0.156, 0.240]
US	0.517 [0.444, 0.590]	0.357 [0.306, 0.409]

Numbers in brackets below the point estimates show the bias corrected 95% bootstrap confidence interval.

*Source:* This reproduces much of Table 2 from Jäntti et al. (2006).

# Estimates of Intergenerational Earnings Elasticities in Countries Other than the United States

<i>Study</i>	<i>Sample</i>	<i>Earnings Measure and Age Range for Sons</i>	<i>Father's Earnings Measure</i>	$\hat{\beta}$
Atkinson, Maynard and Trinder (1983)	Fathers in working-class neighborhoods of York, England, in 1950 and their sons	Log hourly earnings at survey date (1975–78) <sup>a</sup>	Log weekly earnings in 1950	0.42
Björklund and Jäntti (1997)	Swedish Level of Living Surveys	Log annual earnings in 1990; ages 29–38	Prediction of log annual earnings based on education and occupation	0.28
Corak and Heisz (1999)	Canadian income tax records	Log annual earnings in 1995; ages 29–32	Log of five-year average of annual earnings	0.23
Couch and Dunn (1997)	German Socio-Economic Panel	Log of multiyear (up to six-year) average of annual earnings <sup>b</sup>	Log of multiyear (up to six-year) average of annual earnings	0.11
Dearden, Machin and Reed (1997)	British National Child Development Survey	Log weekly earnings in 1991; age 33	Prediction of log weekly earnings based on education and social class	0.57
Gustafsson (1994)	Fathers in Stockholm, Sweden, in 1955 and their sons born in 1939–46	Four-year average of log individual income; ages 31–41	Log individual income in 1955	0.14

Source: Solon (JEP 2002).

## Estimates of Intergenerational Earnings Elasticities in Countries Other than the United States

Hertz (2001)	Co-residing fathers and sons in two South African surveys	Monthly earnings in 1993 or 1998; ages 16–39	Monthly earnings in 1993 or 1998	0.44 <sup>c</sup>
Jäntti and Osterbacka (1996)	Finnish censuses	Log annual earnings in 1990; ages 30–40	Log of two-year average of annual earnings	0.22
Lillard and Kilburn (1995)	Malaysian Family Life Surveys	Log annual earnings in 1988 <sup>d</sup>	Log annual earnings in 1976–77	0.26
Osterbacka (2001)	Finnish censuses	Log of three-year average of annual earnings; ages 25–45	Log of two-year average of annual earnings	0.13
Osterberg (2000)	Swedish income tax records	Three-year average of log annual earnings; ages 25–51	Three-year average of log annual earnings	0.13
Wiegand (1997)	German Socio-Economic Panel	Log monthly earnings in 1994; ages 27–33	Five-year average of log monthly earnings	0.34

<sup>a</sup> Atkinson, Maynard, and Trinder do not report an age range for their regression sample, but their Table 4.4 for a broader sample shows a range from under 25 to over 65.

<sup>b</sup> Couch and Dunn report a sample mean age of 22.8 in 1984, the second of the six years in which they observe earnings.

<sup>c</sup> This elasticity estimate comes from multiplying Hertz's 0.145 coefficient estimate for the intergenerational regression of earnings levels by a 3.0 ratio of fathers' sample mean earnings to sons' sample mean earnings.

<sup>d</sup> Lillard and Kilburn require their sons to be over 18, and they report a sample mean age of 25.

Source: Solon (JEP 2002).

# Summary of International Literature on Intergenerational Earning Persistence for Sons

Study	Country	Data Source	Son's Outcome Variable	Father's Income Variable	Approach to Measurement Error	$\hat{\beta}$
Björklund and Jäntti (1997)	Sweden and the USA	Swedish Level of Living Survey and PSID	Log annual earnings in 1990, sons born 1952–1961.	Father's earnings predicted from education and occupation in a separate data set.	TSIV	Sweden: 0.36 (0.11) USA: 0.52 (0.14)
Gustafsson (1994)	Sweden	Matched register and tax data, for fathers in Stockholm 1955	4-year average of log individual income; sons born 1939–1945.	Father's individual income in 1955.	4-year average	0.14 (0.07)
Österberg (2000)	Sweden	Matched register data	Sons aged 25 and over in 1990, earnings averaged 1990–1992	Fathers' average earnings in 1978–1980	3-year average	0.129 (0.011)
Björklund and Chadwick (2003)	Sweden	Matched register data	Sons born 1962–1965, earnings observed in 1999.	Father's income averaged from 1970 to 1975	5-year average	0.24 (0.01)
Hirvonen (2007)	Sweden	Matched register data	Sons born 1960–1966 earnings averaged over 1997–2000	Parental income averaged 1970–1975.	5-year average	0.275 (0.004)
Österbacka (2001)	Finland	Finnish quinquennial population census	Log average annual earnings in 1985, 1995, 2000; sons born 1950–1960.	Log average annual earnings in 1970 and 1975.	2-year average but 5 years apart	0.13 (0.005)
Pekkarinen <i>et al.</i> (2009)	Finland	Finnish quinquennial population census	Son's earnings in 2000 at ages 34–40, born 1960–1966.	Father's earnings averaged over 1970, 1975, 1980, 1985, 1990 at an unknown age.	Average over 5 periods, in total 20 years apart.	0.23–0.30 (around 0.020)
Nilsen <i>et al.</i> (forthcoming)	Norway	Matched register data	Sons earnings averaged over ages 36–40; born 1959–1962.	Father's earnings averaged over different periods. Fathers born 1927–1942.	Time averaging, as reported in next column	67–71: 0.338 72–76: 0.282 77–81: 0.253 82–86: 0.163 67–91: 0.292

Source: Blanden *Journal of Economic Surveys* (2013)

## Summary of International Literature on Intergenerational Earning Persistence for Sons

Hussein, Munk and Bonke (2008)	Denmark	Matched register data	Son's annual earnings in 2000 at ages 30–40, born 1960–1970.	Father's annual earnings averaged over 1984–1988 when aged 30–66.	Average over 5 years	0.136 (0.004)
Corak and Heisz (1999)	Canada	Matched income tax data	Log annual earnings in 1995; sons born 1963–1966.	Father's log annual earnings averaged over 1978–1982.	5-year average of father's earnings	0.23 (0.01)
Atkinson (1981)	UK	Follow-up of Rowntree York Sample	Log weekly earnings at survey date (1975–1978).	Log weekly earnings in 1950.	None	0.36 (0.03)
Dearden <i>et al.</i> (1997)	UK	National Child Development Survey	Log weekly earnings at age 33 for a cohort born in 1958.	Father's log weekly earnings when son aged 16.	IV using father's education and social class	0.58 (0.06)
Nicoletti and Ermisch (2007)	UK	British Household Panel Survey	Average log earnings over 1991–2003 for sons born 1952–1970	Information on occupation, education and age of fathers used to predict their earnings. Prediction is from older men in 1991 or as close to as possible.	TSIV	0.29 (0.06)
Lefranc and Trannoy (2005)	France	French Education–Training–Employment surveys 1964–1993 (FQP)	Log annual earnings for sons aged 30–40, 1993 FQP.	Information on father's education and social class used to predict earnings from similar-aged men in FQP.	TSIV	Approx. 0.4

OLS results are  
0.24 (0.027)

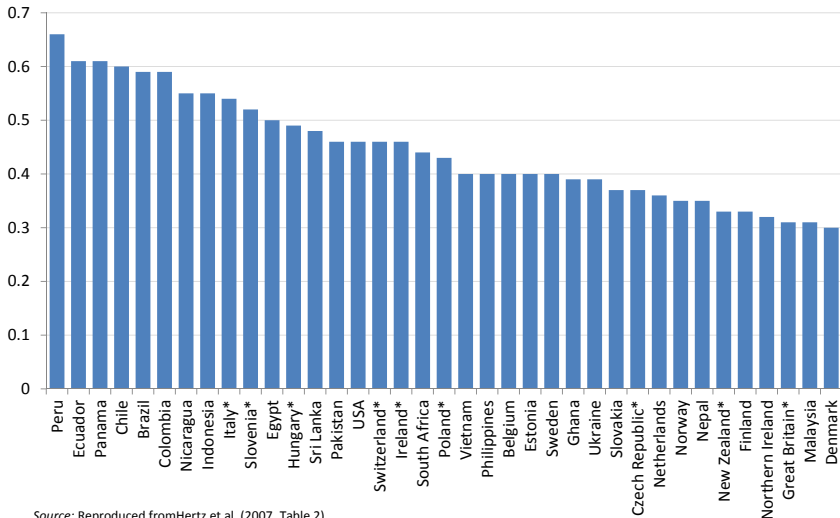
Source: Blanden *Journal of Economic Surveys* (2013)

# Summary of International Literature on Intergenerational Earning Persistence for Sons

Study	Country	Data Source	Son's Outcome Variable	Father's Income Variable	Approach to Measurement Error	$\hat{\beta}$
Piraino (2007)	Italy	Bank of Italy Survey on Household Income and Wealth (SHIW)	Log annual earnings in 2000, 2002, 2004 for 30–45 year olds whose fathers were born between 1927 and 1949	Information on father's education, employment status, occupation and region used to predict income from men in 1977–1979 SHIW aged 30–50.	TSIV	0.435 (0.035)
Mocetti (2007)	Italy	SHIW as above	Log annual earnings in 2000, 2002, 2004 for 30–50 year olds	Information on education, sector, region and occupational qualification used to predict income from men in 1977–1980 aged 30–50.	TSIV	0.499 (0.051)
Leigh (2007a)	Australia	Household Income and Labour Dynamics in Australia	Log annual earnings in 2004 for sons aged 25–54.	Average earnings in 2004 for men in father's occupation where father's occupation is recalled by adult son.	TSIV	Australia: 0.2–0.3

Source: Blanden *Journal of Economic Surveys* (2013)

## Average Parent—Child Schooling Correlation, Ages 20–64



Source: Reproduced from Hertz et al. (2007, Table 2).

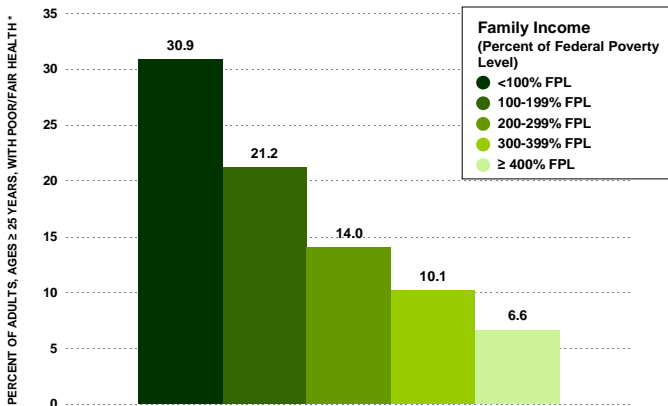
Surveyed between 1994 and 2004, except Peru (1985), Malaysia (1988) and Pakistan (1991).

\* Ages 20 to 64 or 65 only.

## 10. Health Inequality



## Health by Income



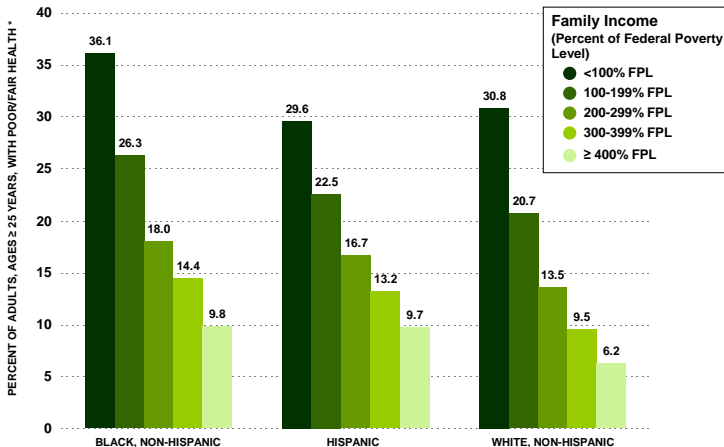
\*In 2005, the Federal Poverty Level for the 48 contiguous states and the District of Columbia was \$16,090 for a family of three and \$19,350 for a family of four.

\*Age-adjusted

Source: National Health Interview Survey, 2001-2005.

Proportion of adults with fair/poor health, by family income (percent of the Federal Poverty Line). Source: Robert Wood Johnson Foundation, Commission to Build a Healthier America.

## Health by Income and Race



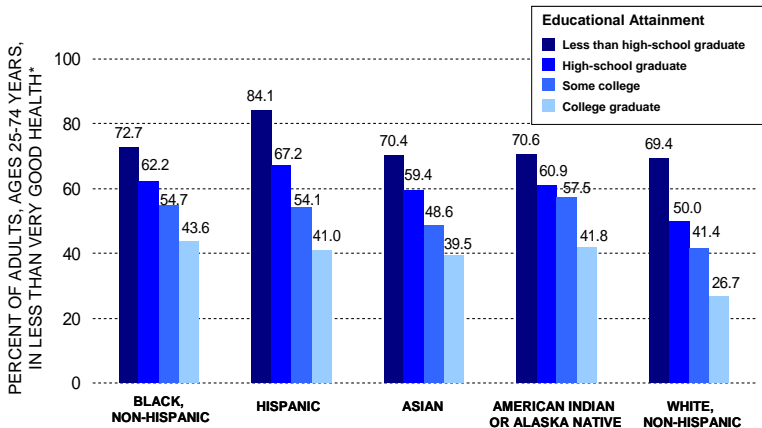
\*Age-adjusted

Source: National Health Interview Survey, 2001-2005.

Proportion of adults with fair/poor health, by family income (percent of the Federal Poverty Line). Source: Robert

Wood Johnson Foundation, Commission to Build a Healthier America.

## Health by Education



Source: Behavioral Risk Factor Surveillance System Survey Data, 2005-2007.

† Based on self-report and measured as poor, fair, good, very good or excellent.

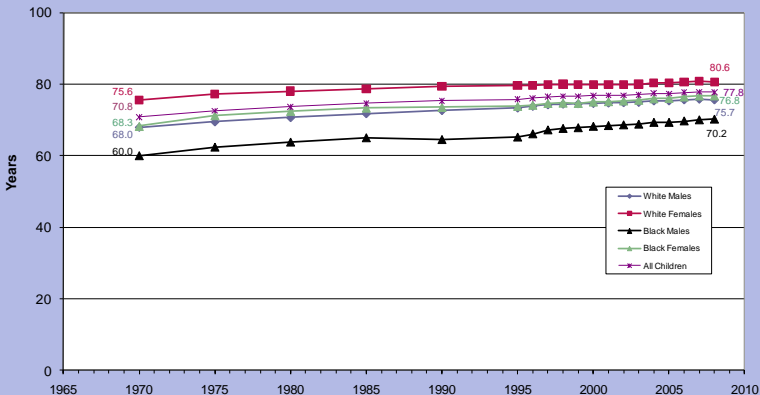
\* Age-adjusted.

Proportion of adults with fair/poor health, by education and race/ethnicity. Source: Robert Wood Johnson Foundation,

# Life Expectancy by Race: U.S.

Figure 4

## Estimated Life Expectancy of Newborns, by Year of Birth, Race, and Gender, Selected Years 1970-2008\*



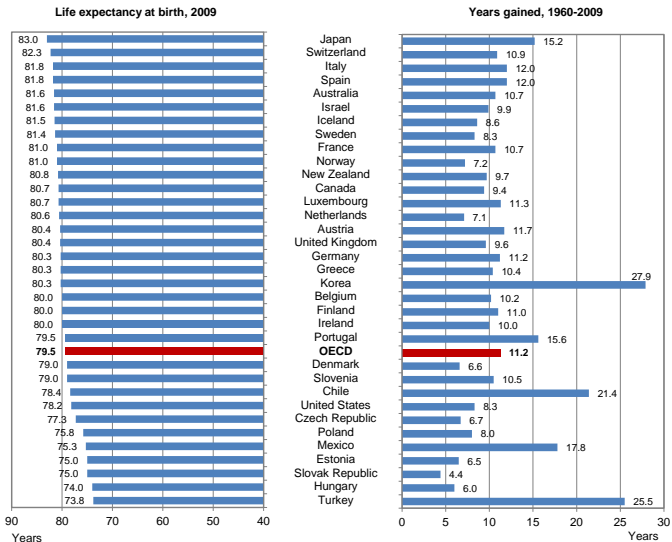
\*2008 data are preliminary.

Source: Data for 1929-1999 from: Arias, E. United States life tables, 2000. *National vital statistics reports*; vol 51 no 3. Hyattsville, Maryland: National Center for Health Statistics. 2002. Table 12; Data for 2000-2006 from: Heron MP, Hoyert DL, Murphy S, Xu J, Kochanek KD, & Tejada-Vera B. "Deaths: Final Data for 2006" *National Vital Statistics Reports* 57 (14)

[http://www.cdc.gov/nchs/data/nvsr/nvsr57/nvsr57\\_17.pdf](http://www.cdc.gov/nchs/data/nvsr/nvsr57/nvsr57_17.pdf). Data for 2007-2008: Minino AM, Xu J, and Kochanek KD, "Deaths: Preliminary Data for 2008." *National Vital Statistics Reports* 59(2). [www.cdc.gov/nchs/data/nvsr/nvsr59/nvsr59\\_02.pdf](http://www.cdc.gov/nchs/data/nvsr/nvsr59/nvsr59_02.pdf).

# Life Expectancy: International Comparison

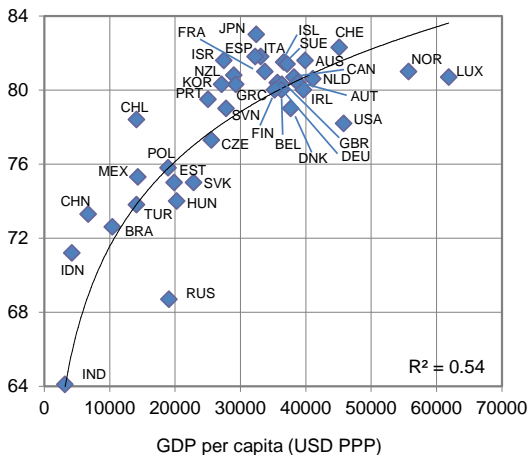
Life expectancy at birth, 2009 (or nearest year available), and years gained since 1960



Source: OECD Health Data 2011.

## Life Expectancy: International Comparison

Life expectancy at birth and GDP per capita, 2009 (or nearest year)



Source: OECD Health Data 2011; World Bank and national sources for non-OECD countries.

## Infant Mortality and Low Birth Weight

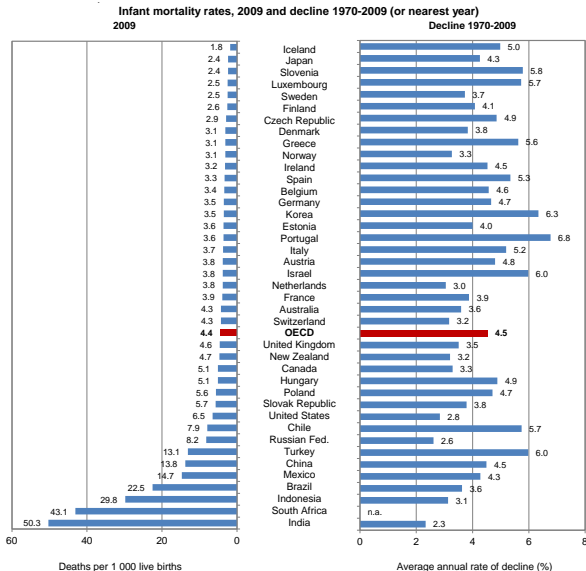
## Infant Mortality

- Infant mortality rates vary widely across countries in US.
- US ranks 30<sup>th</sup> in international rankings.
- Black and American Indian or Alaska Native babies are much more likely than babies in other racial or ethnic groups to die in their first year of life.





# Infant Mortality: International Comparison



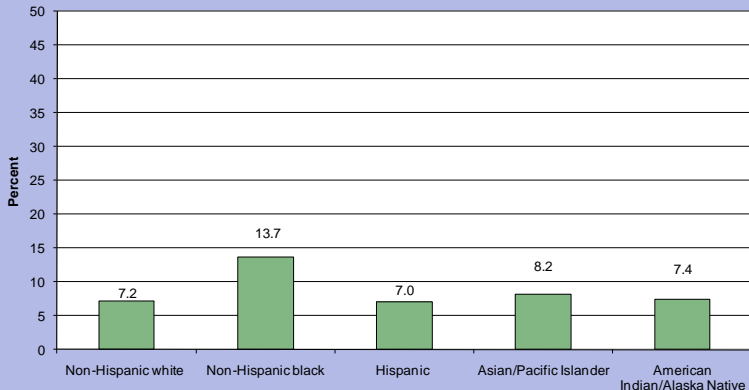
Source: OECD Health Data 2011; World Bank and national sources for non-OECD countries.

## LBW by Race

- Non-Hispanic black infants are more likely than babies of other races to be low birthweight.
- In 2008, 13.7% of non-Hispanic black infants were low birthweight, compared with 8.2% of Asian and Pacific Islanders, 7.4% of American Indians and Alaska Natives, 7.2% of non-Hispanic whites, and 7.0% of Hispanic infants.

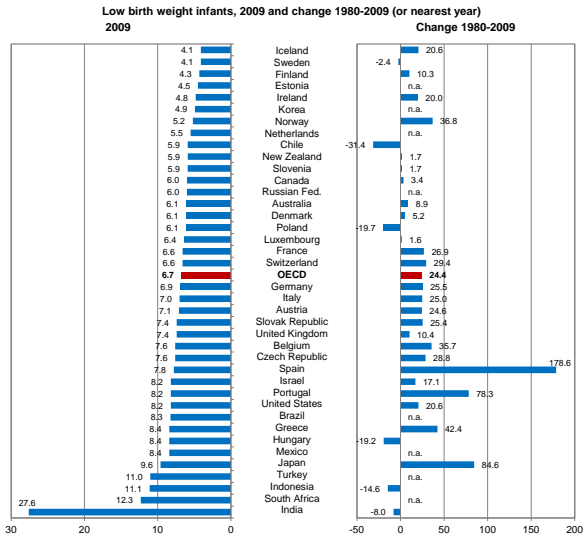
## LBW by Race

Figure 2

Percentage of Infants Born at a Low Birthweight,  
by Race and Hispanic Origin, 2008

Source: Martin JA, Hamilton BE, Sutton, PD, and Ventura SJ. (2010). "Births: Final Data for 2008." National Vital Statistics Reports; vol 59(1). Hyattsville, MD: National Center for Health Statistics. [http://www.cdc.gov/nchs/data/nvsr/nvsr59/nvsr59\\_01.pdf](http://www.cdc.gov/nchs/data/nvsr/nvsr59/nvsr59_01.pdf)

# LBW: International Comparison

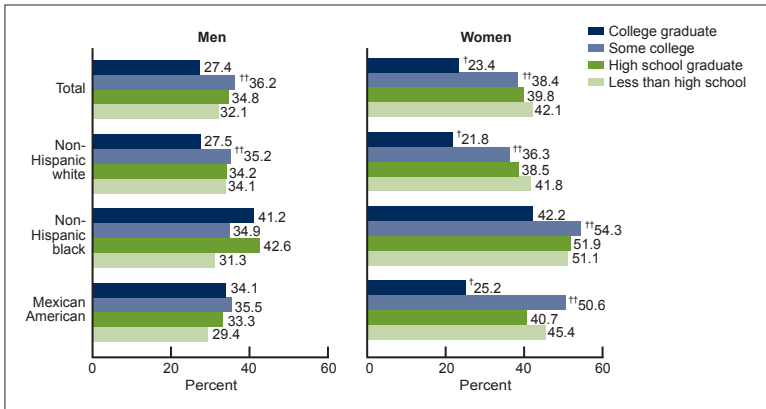


Source: OECD Health Data 2011; World Bank and national sources for non-OECD countries.

## Adult Health

# Obesity

Figure 3. Prevalence of obesity among adults aged 20 years and over, by education, sex, and race and ethnicity: United States 2005–2008



†Significant trend.

††Significantly different from college graduates.

NOTE: Persons of other race and ethnicity included in total.

SOURCE: CDC/NCHS, National Health and Nutrition Examination Survey, 2005–2008.

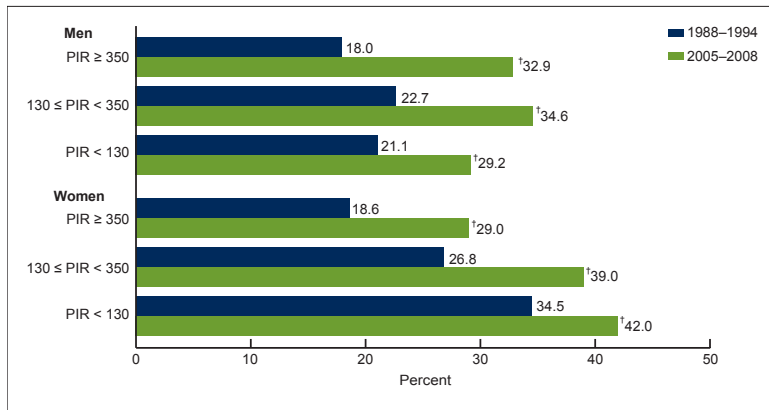
## Obesity

- Between 1988–1994 and 2007–2008 the prevalence of obesity among adults increased at all income levels.



# Obesity

Figure 4. Prevalence of obesity among adults aged 20 years and over, by poverty income ratio and sex: United States, 1988–1994 and 2005–2008



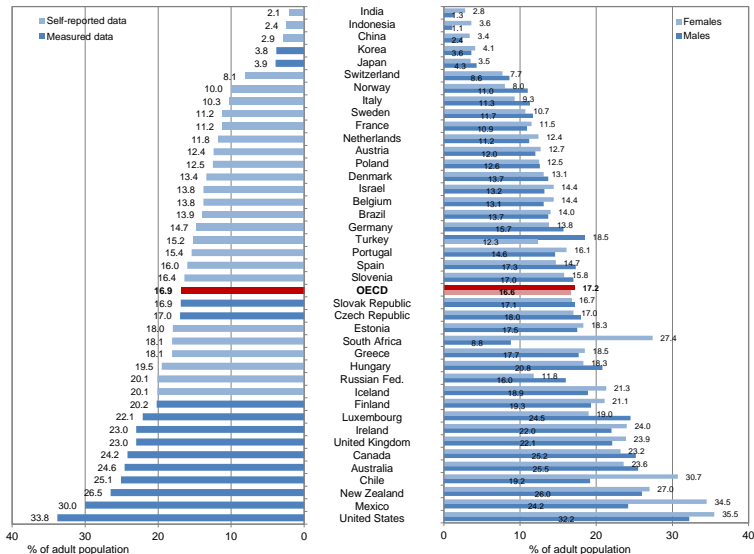
†Significant increase.

NOTE: PIR is poverty income ratio.

SOURCES: CDC/NCHS, National Health and Nutrition Examination Survey, 1988–1994 and 2005–2008.

# Obesity: International Comparison

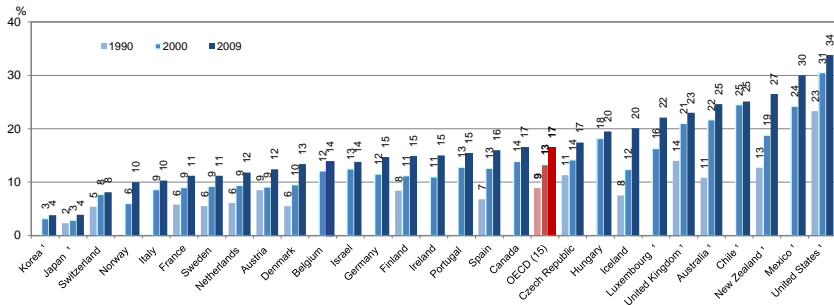
Prevalence of obesity among adults, 2009 (or nearest year)



Source: OECD Health Data 2011; national sources for non-OECD countries.

# Obesity: International Comparison

Increasing obesity rates among the adult population in OECD countries, 1990, 2000 and 2009 (or nearest years)



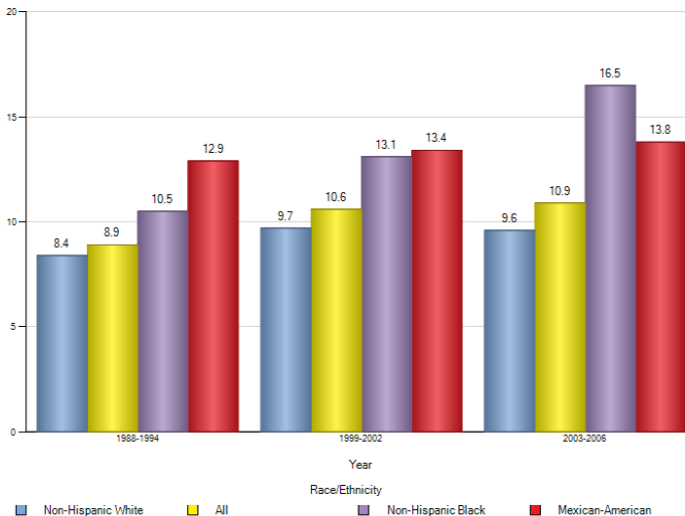
1. Data are based on measurements rather than self-reported height and weight.

Source: OECD Health Data 2011.

## Diabetes

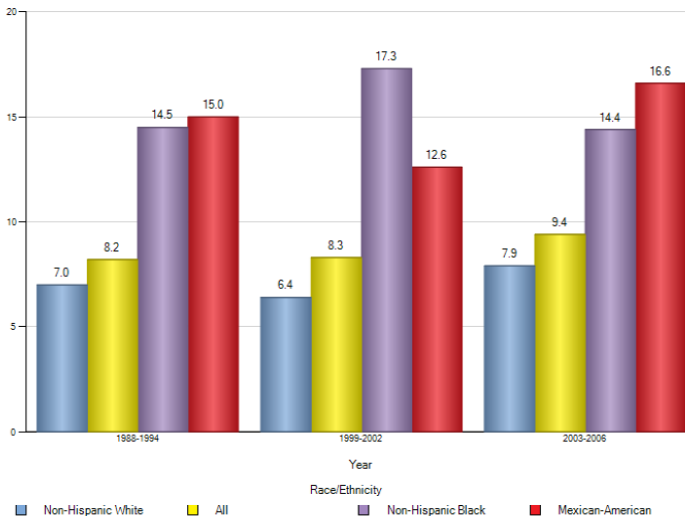
1. In the last 20 years, there has been an upward trend in the prevalence of diabetes among all ethnic groups for males and females.
2. The increase has been particularly dramatic for non-Hispanic Black males.
3. For non-Hispanic Black females, instead, after a peak in 1999-2002, diabetes prevalence has gone back to the rates of 1988-1994.
4. Mexican-Americans have the highest prevalence in 2003-2006 for females.

## Diabetes — Males, Age 20+



Source: National Center for Health Statistics (NCHS)

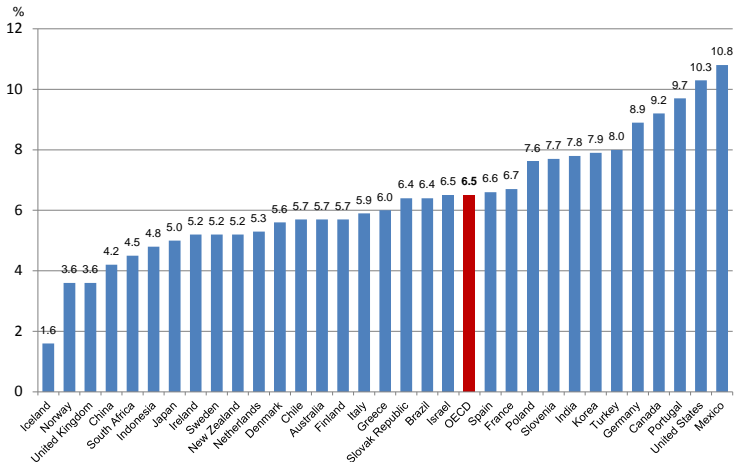
## Diabetes — Females, Age 20+



Source: National Center for Health Statistics (NCHS)

# Diabetes: International Comparison

Prevalence estimates of diabetes, adults aged 20-79 years, 2010



Note: The data cover both Type 1 and Type 2 diabetes. Data are age-standardised to the World Standard Population.

Source: IDF (2009).

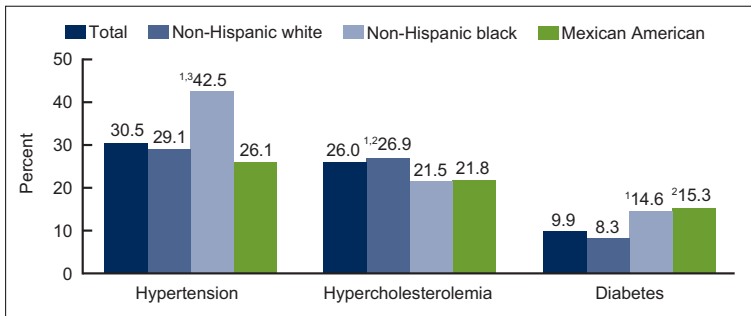
## Metabolic Diseases

- Non-Hispanic Blacks have significantly higher rates of hypertension.
- Non-Hispanic Whites have significantly higher rates of hypercholesterolemia.



## Metabolic Diseases

Figure 1. Age-adjusted prevalence of diagnosed or undiagnosed hypertension, hypercholesterolemia, and diabetes in adults, by race/ethnicity: United States, 1999–2006



1 is the significant difference between non-Hispanic white and non-Hispanic black persons.

2 is the significant difference between non-Hispanic white and Mexican-American persons.

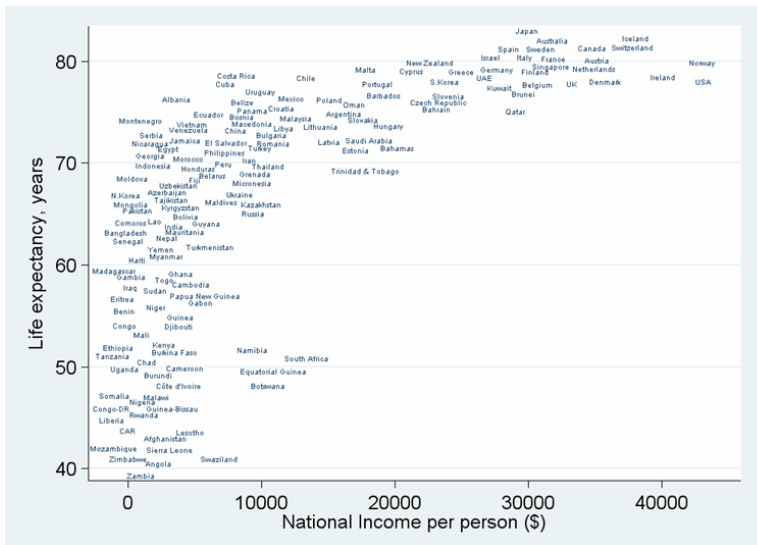
3 is the significant difference between non-Hispanic black and Mexican-American persons.

NOTE: Persons of other race/ethnicity included in total.

SOURCE: CDC/NCHS, National Health and Nutrition Examination Surveys, 1999–2006.

## Relation between Inequality and Health

# Income per Head and Life Expectancy: Rich and Poor Countries

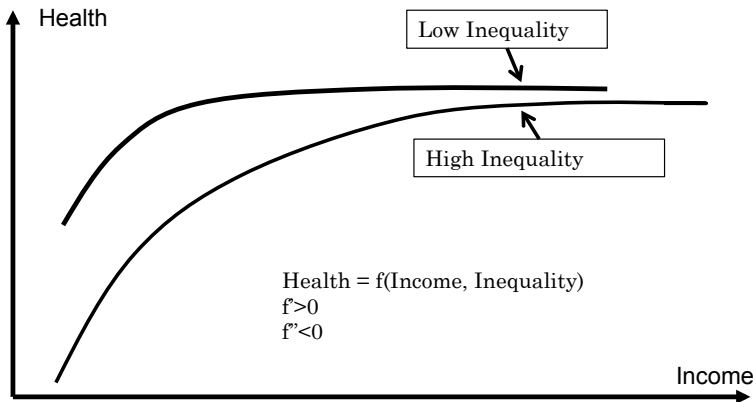


## Life Expectancy is Longer in More Equal Rich Countries

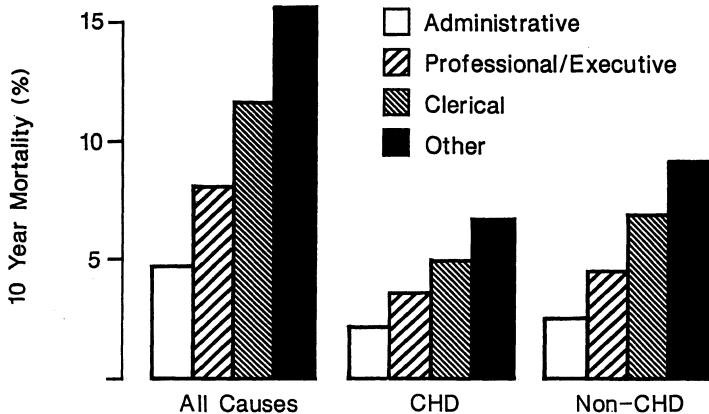


Source: Wilkinson and Pickett, *The Spirit Level* (2009)

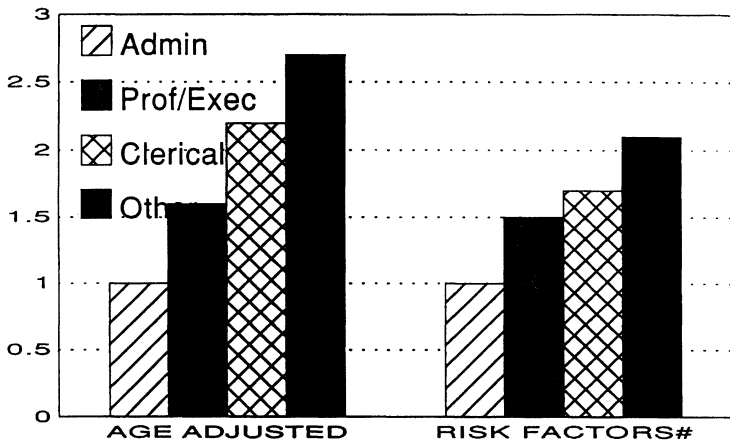
## Income, Inequality and Health



## Age Adjusted Mortality Rates (percentage) by Grade of Employment for Civil Servants Aged Forty to Sixty-four in the Whitehall Study



## Risk of CHD Death in Ten Years (controlling for age and other risk# factors)



# age, smoking, blood pressure, cholesterol, height, and blood sugar

## Child Well-being and Income Inequality



*Pickett and Wilkinson, BMJ, 2007*



## Correlations of measures of child wellbeing with income inequality, and average income across the 50 US states

Measure of child wellbeing	Income inequality		Average income	
	<i>r</i>	P value	<i>r</i>	P value
Teenage births <sup>12</sup>	0.72	<0.001	-0.55	<0.001
Juvenile homicides <sup>12</sup>	0.31	0.03	0.00	0.99
Infant mortality*	0.55	<0.001	-0.20	0.15
Low birth weight*	0.65	<0.001	-0.01	0.99
Educational performance (combined maths and reading scores for 15 year olds)† <sup>4</sup>	-0.69	<0.001	0.08	0.58
Dropping out of high school† <sup>4</sup>	0.66	<0.001	-0.28	0.04
Overweight	0.64	<0.001	-0.07	0.63
Mental health problems	0.37	0.01	-0.14	0.33

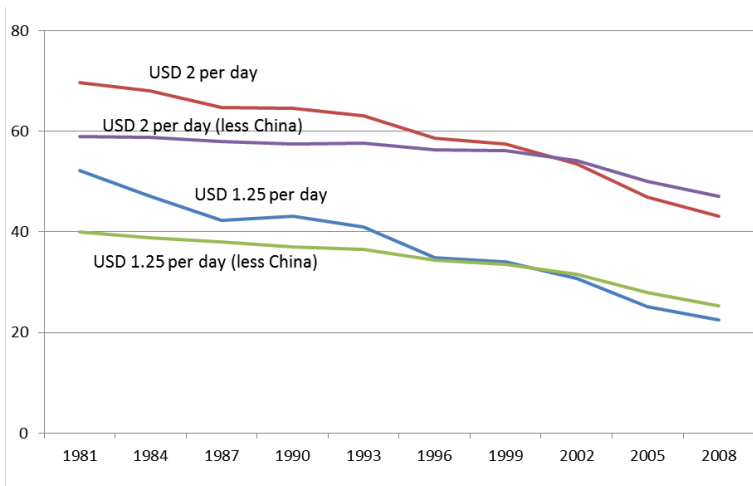
\*Similar findings have been reported elsewhere.<sup>11 40</sup>  
 †Similar findings have been reported elsewhere.<sup>11</sup>

**Pickett and Wilkinson, BMJ, 2007**

## 11. Inequality in Developing Countries

# Poverty Rates

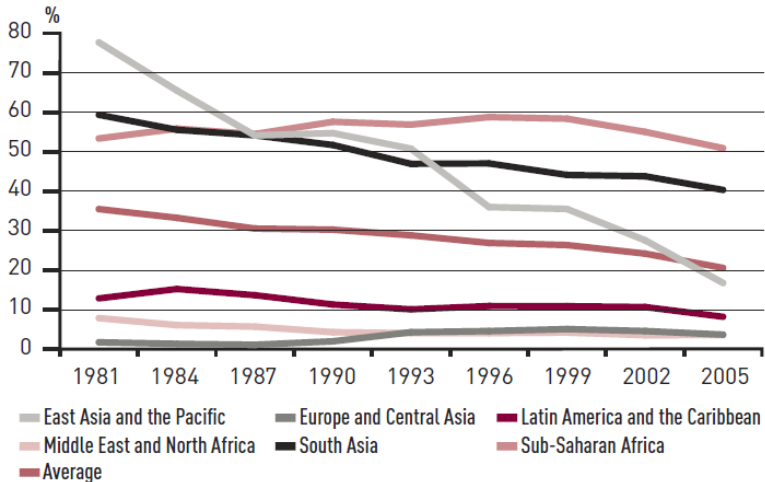
## Poverty Rates for the Developing World, 1981-2008



Source: Source: World Bank (2012b)

## Poverty Rates

### Proportion of the population living on less than \$1.25 a day



Source: World Bank Development Research Group 2009; see also UNDESA (2010).

## Global Wage Inequality (Rosenzweig, 2010)

## Global Inequality: Comparisons of the Global Variation in Schooling, Schooling Returns, Per Capita GDP, and Skill Prices

	Number of countries	Coefficient of variation	Span (ratio)	Interquartile range (ratio)
Average years of schooling, 15+ population	106	0.474	14.4	2.2
Mincer schooling return	52	0.494	11.7	1.7
GDP per adult equivalent	139	0.948	76.7	4.9
Skill price	130	0.807	108.9	3.6

*Source:* Average years of schooling: Barro and Lee 1997; Mincer schooling return: Bils and Klenow 2002; GDP: World Tables 2003; skill price: estimated by the author using the New Immigrant Survey.

## Participation in the Labor Market

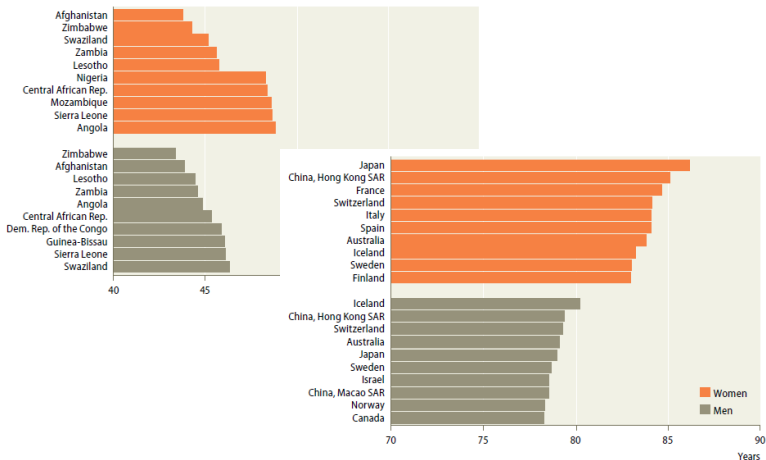
### Labor Force Participation Rate of Persons Aged 15 Years or over by Region and Sex

	Female labour force participation rate (%)			Male labour force participation rate (%)		
	1990	2010	Difference	1990	2010	Difference
<b>Africa</b>						
Northern Africa	23	29	6	76	74	-2
Sub-Saharan Africa	60	62	2	82	80	-2
<b>Asia</b>						
Eastern Asia	72	69	-3	85	79	-6
South-Eastern Asia	59	57	-2	83	83	0
Southern Asia	35	36	1	85	81	-4
Western Asia	26	23	-3	79	72	-7
CIS in Asia	68	60	-8	81	73	-8
<b>Latin America and the Caribbean</b>						
Caribbean	39	48	9	75	72	-3
Central America	35	43	8	84	79	-5
South America	38	59	21	81	80	-1
<b>Oceania</b>						
Oceania	62	64	2	77	75	-2
<b>More developed regions</b>						
Eastern Europe	58	54	-4	73	66	-7
Rest of more developed regions	50	53	3	74	69	-5

Source: Computed by the United Nations Statistics Division based on data from ILO, Economically Active Population Estimates and Projections 1980–2020 (accessed in June 2009).

## Health

## World's highest and lowest life expectancies at birth by sex

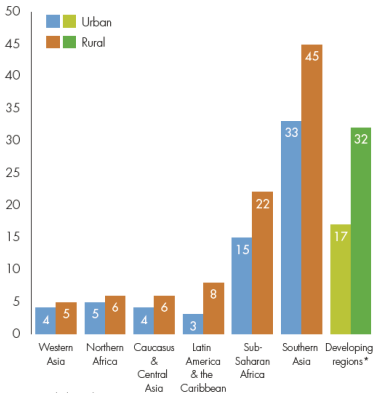


Source: United Nations, *World Population Prospects: The 2008 Revision*



# Health

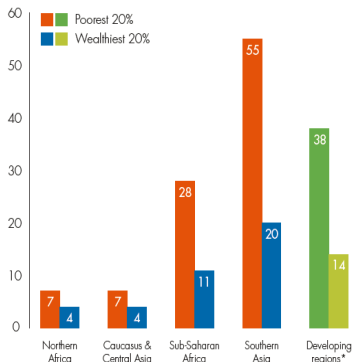
## Proportion of under-five children who are underweight, 2006/2010



\*Excluding China. United Nations, The Millennium Development Goals Report, 2012

Note: Regional averages are based on a subset of 70 countries with residence area information covering 62 per cent of the rural population and 53 per cent of the urban population in the developing region.

## Proportion of under-five children who are underweight, developing regions, by wealth quintile, 2006/2010

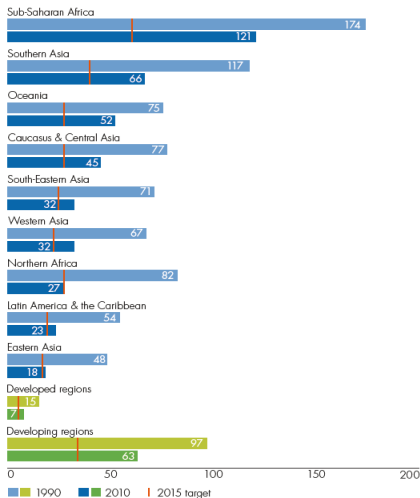


\*Excluding China. United Nations, The Millennium Development Goals Report, 2012

Note: These regional averages are based on a subset of 65 countries with wealth quintile information covering 54 per cent of the 20 per cent poorest population and 20 per cent richest population in the developing regions.

# Health

## Under-five mortality rate, 1990 and 2010 (Deaths per 1,000 live births)

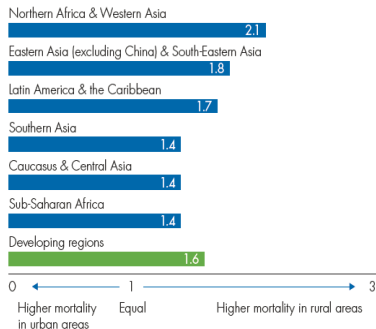


Child mortality falls by more than one third, but progress is still too slow to reach the target

Source: United Nations, The Millennium Development Goals Report, 2012

## Health

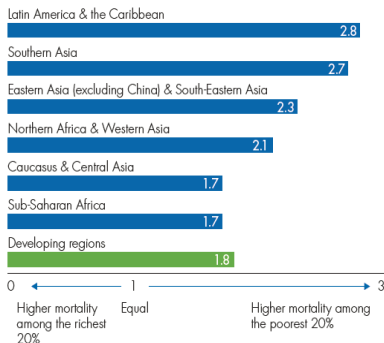
### Ratio of rural to urban under-five mortality rates, 2000/2010



Source: United Nations, The Millennium Development Goals Report, 2012

Note: Analysis is based on 82 developing countries with data on under-five mortality rate by residence, accounting for 75 percent of total births in developing countries in 2010.

### Ratio of under-five mortality rate for children from the poorest 20 per cent of households to children from the richest 20 per cent, 2000/2010

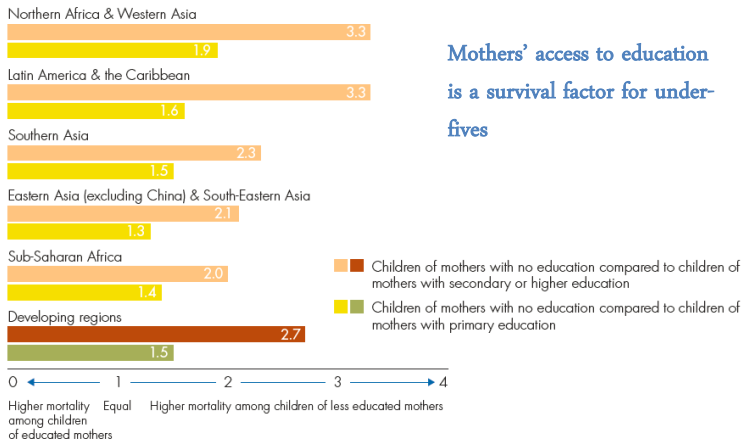


Source: United Nations, The Millennium Development Goals Report, 2012

Note: Analysis is based on 73 developing countries with data on under-five mortality rate by household's wealth quintile, accounting for 71 percent of total births in developing countries in 2010.

## Health

**Ratio of under-five mortality rate of children of mothers with no education to that of children of mothers with secondary or higher education, and of children of mothers with no education to children of mothers with primary education, 2000/2010**

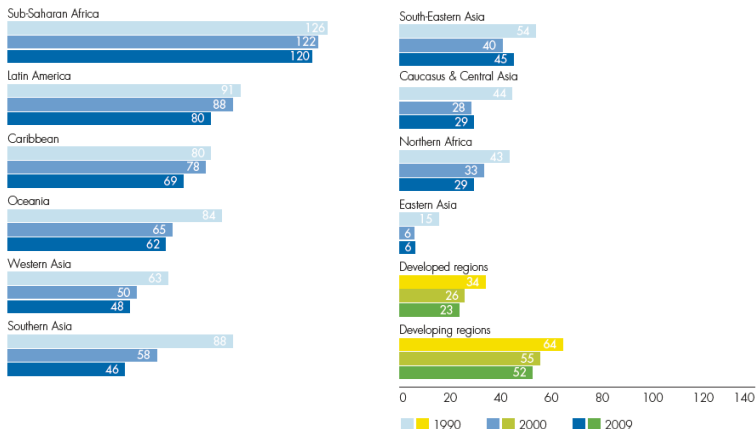


Source: United Nations, The Millennium Development Goals Report, 2012

Note: Analysis is based on 78 developing countries with data on under-five mortality rates by mother's education, accounting for 75 percent of total births in developing countries in 2010.

# Health

## Number of births per 1,000 women aged 15-19



Source: United Nations, The Millennium Development Goals Report, 2012

## Appendix

- Wages of labor in task  $l$ :  $W_l(q) = \sum_{j=1}^J P_{q_j}^l q_j$ ,  $l = 1, \dots, L$ .
- $H_l$  = Hours supplied in task  $l$ ,  $l = 1, \dots, L$
- Earnings =  $\sum_{l=1}^L W_l(q) H_l$
- Conventional case is scalar task and efficiency units
- More general hedonic models  $W_l(q)$  nonlinear with pricing determined in markets.

- Distinctions: *Ex Ante* vs. *Ex Post* (Acquisition of Information)
  1. Agent decisions based on *Ex Ante* calculations
  2. Most measurements: *Ex Post*  
(exception is literature on estimating and measuring expectations)
  3. Distinction between *Ex Ante* and *Ex Post* inequality plays a big role in this analysis. Acquisition of information is an important activity and is productive in its own right.
  4. Role of insurance and family transfers as insurance
  5. The realizations of shocks - chance - luck? How much inequality is due to micro and macro shocks? How much is due to individual choices? To traits that are developed and changed over the life cycle?

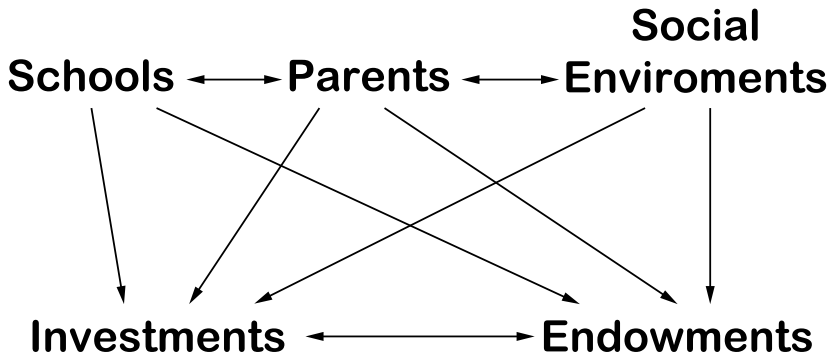


## Issues

- Pricing
  - What market/ Institutional Features determine the  $W_l(q)$ ?
  - How important are Market Forces vs. Institutional Features that restrict or enhance choices; Interactions between Market Forces and Institutional Features.  
(e.g., segmented labor markets; unions; minimum wages)

- Determination of Labor Quality (Capabilities)
  - Endowments
    1. Heritability
    2. Epigenetic Factors and Early Family (Perinatal) Environments
  - Investment
    1. Parents
    2. Siblings
    3. Schools
    4. Neighborhood effects — Peer effects and social interactions
    5. Larger social and cultural forces
  - Using economic theory to interpret intergenerational correlations of economic advantage

## Vague Descriptions In The Literature That We Will Try to Break Into



- Parents—Intergenerational Links—Interpretation of the cross section relationships

- Comparative Advantage and Sorting in the Labor Market
  - a. Tasks and occupations
  - b. Roy model plays a central role
  - c. There may be uncertainty and the role of search functions—imperfect information and costs of search—may be substantial.

## Earning Dynamics and Consumption Dynamics

Beyond Income-Based Measures:  
Welfare and Consumption Measures (For Individuals and  
Households)

## Capability Formation Process

- The capability formation process is governed by a multistage technology.
- Each stage corresponds to a period in the life cycle of a person.

- Adult choices and outcomes are shaped by *sequences* of investments by parents and social institutions over the life cycle of the child and the adult.
- Different decision makers make the investments over the life cycle.
- The importance of the early years depends on how easy it is to reverse adverse early effects with later investment in adolescence and adult life.
- Resilience and remediation are possible, but are often more costly strategies. But this depends on the particular capability so formed.
- The cumulation of investments over the life cycle of the child and adolescent determine adult outcomes and the choices people will make when they become adults.
- There is adult-post school investment.
- To capture these interactive effects requires nonlinear models.

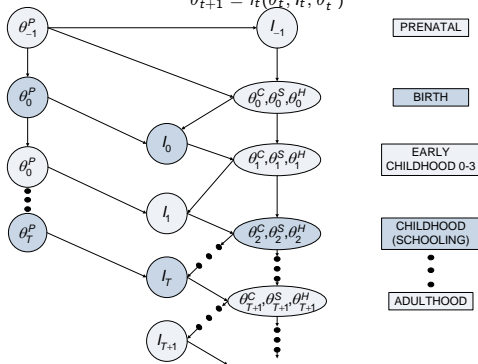
# A Life Cycle Framework for Organizing Studies and Integrating Evidence: $T + 1$ Periods of Life Cycle

$\theta_t = (\theta_t^C, \theta_t^S, \theta_t^H)$  capacities at  $t$

$I_t$ : investment at  $t$

$\theta_t^P$ : parental capabilities at  $t$

$\theta_{t+1} = f_t(\theta_t, I_t, \theta_t^P)$





## Twin Studies: Beyond Nature vs. Nurture

- a. Role of genetics ( $\theta_0$ ): Recall  $\theta_0$  is a vector and heritability studies refer to all components (cognition, health, personality)
- b. Parent-child interactions and the dynamics family investment
- c. The evidence on *epigenetics* and early imprinting
- d. Do parents and/or parenting matter?
- e. Does the social environment matter?

## Education and Structure of Returns to Education

- a. What is the rate of return?
- b. What do instrumental variables models of “returns to schooling” estimate?
- c. Role of family influence  
(Genes and Family investments)
- d. Role of asset markets and constraints: How important are Financial Constraints?
- e. Peer effects—sorting into components

## Adult Skill Formation

1. Schooling (academic and workplace-based education)  
(Ben Porath and beyond; OJT, learning and search models.  
What are the mechanisms for forming skills?)
2. OJT (on and off the job)
3. Learning by doing
4. Work-based learning: (About one's self, one's job, and one's match)
  - 4.a Bayesian Learning and Bandit problems
  - 4.b Stepping stone mobility (career mobility)

### Questions:

- a. The evidence on these models
- b. Can we distinguish among alternative mechanisms of learning and producing knowledge?

## Integration of Micro Models With the Macro Economy

1. Aggregate uncertainty
2. Micro uncertainty, search and shocks
3. G.E. Models

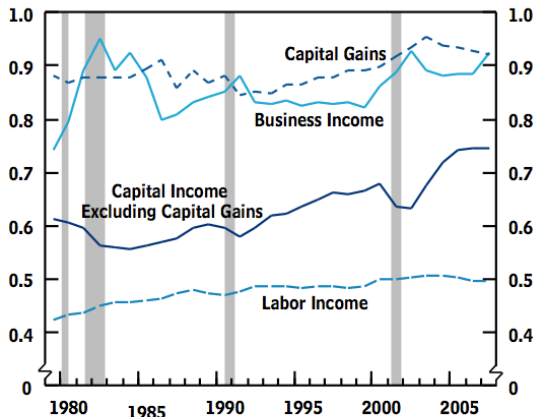
- Frameworks for measuring wage differentials, inequality, and disparity
  1. Commonly Used Measurement Frameworks
  2. Their Economic Interpretations in Terms of Pricing Models
  3. Application of Frameworks
  4. Means, Variances, and Beyond
  5. Counterfactual analyses of income inequality and policies

## Frameworks for Policy Analysis

- a. *Ex Ante* vs. *Ex Post* welfare
- b. Subjective (agent evaluation) outcomes vs. Objective outcomes.

## Income Concentration, by Major Income Source

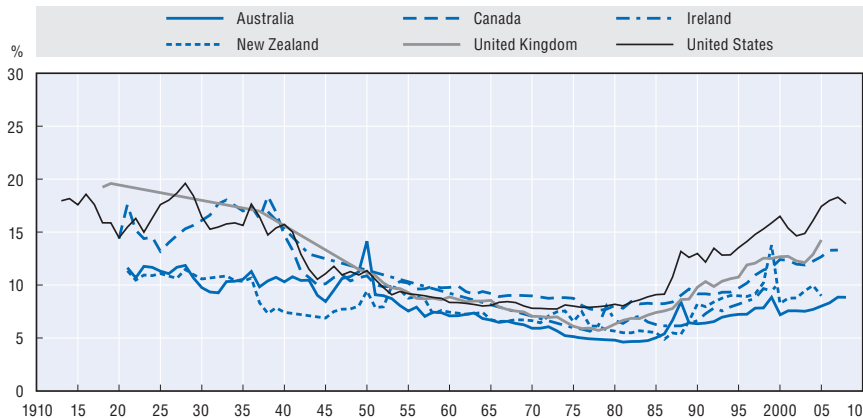
(Concentration index)



Source: Congressional Budget Office.

Income — Household Income.

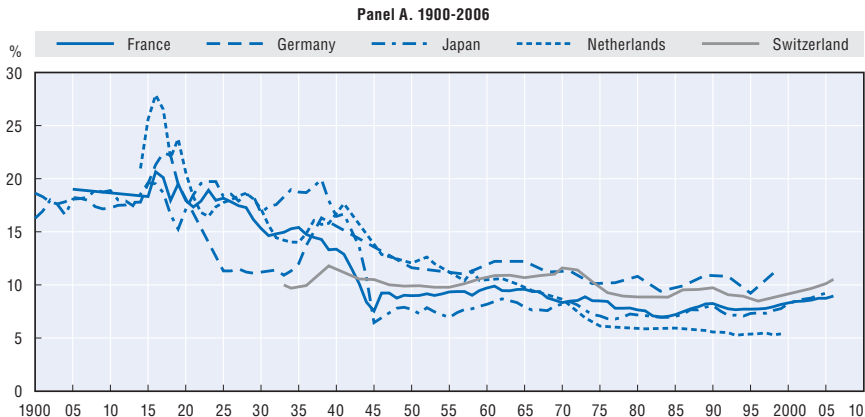
## Top 1% income share, 1910-2008



Source: Income refers to **individual** income. Alvaredo et al. (2011). Country delegate information: Australia (2000-2008) and Canada (1970-2007).

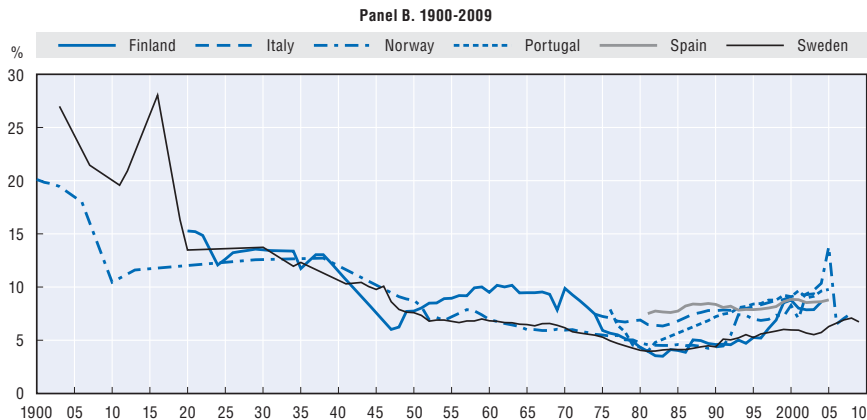


# Top 1% income share, 1900-2009



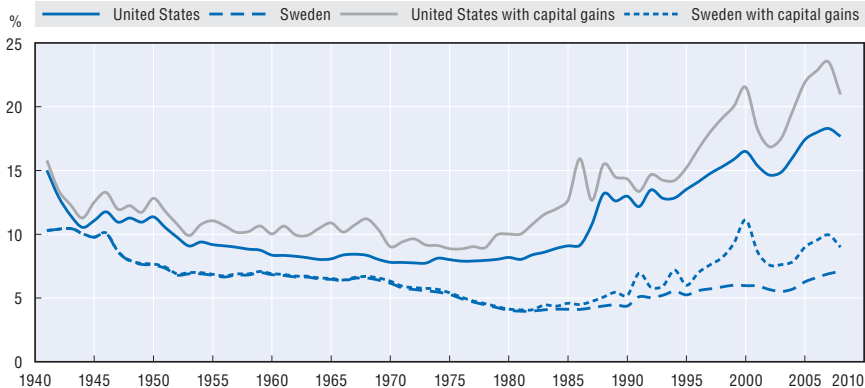
Source: Alvaredo et al. (2011). Roine and Woldenström (2008); Sweden (2007-2009). Country delegate information: Switzerland (1970-2006) and Norway (1991-2008).

# Top 1% income share, 1900-2009



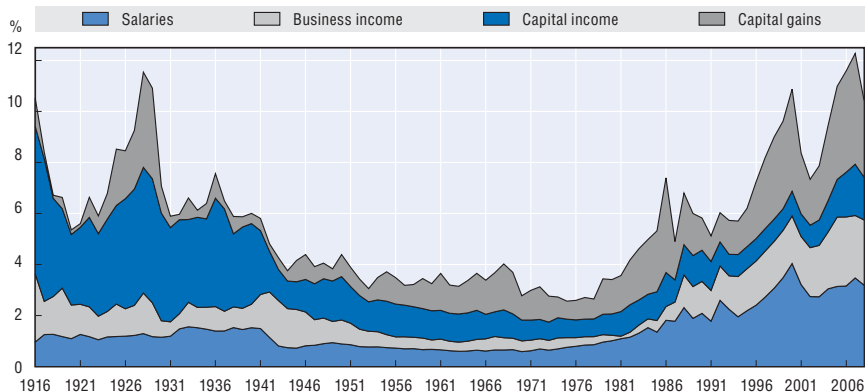
Source: Alvaredo et al. (2011). Roine and Woldenström (2008); Sweden (2007-2009). Country delegate information: Switzerland (1970-2006) and Norway (1991-2008).

# Effect of capital gains on share of top percentile, 1940-2008



Source: Sweden: Roine and Waldenström (2008); United States: Alvaredo et al. (2011).

## Top 0.1% income share and composition, United States, 1916-2008



*Note:* The figure displays the top 0.1% income share and its composition. Top 0.1% defined by market income including realised capital gains.

*Source:* Alvaredo et al. (2011).

**Table 2: Trends in the size of tax units and households.****Panel A: Tax Units per Household**

	Tax Units (Thousands)	Households (Thousands)	Mean Tax Units per Household	Percent of Households with one, two, or more Tax Units		
				One	Two	≥Three
1979	98,958	79,399	1.25	80.3	15.8	3.9
1989	119,705	93,626	1.28	78.4	16.8	4.8
2000	137,810	106,512	1.29	77.1	18.0	4.9
2007	153,322	116,881	1.31	76.2	18.2	5.6

**Panel B: Unrelated Tax Units per Household**

	Unrelated Tax Units (Thousands)	Households (Thousands)	Mean Unrelated Tax Units per Household	Percent of Households with one, two, or more Unrelated Tax Units		
				One	Two	≥Three
1979	83,690	79,399	1.05	95.3	4.2	0.5
1989	100,606	93,626	1.07	93.4	6.0	0.6
2000	117,146	106,512	1.10	91.2	7.9	0.9
2007	128,751	116,881	1.10	91.1	8.0	0.9

---

**Panel C: Individuals per Tax Unit**


---

	<b>Individuals (Thousands)</b>	<b>Tax Units (Thousands)</b>	<b>Mean Individuals per Tax Unit</b>	<b>Percent of Tax Units with one, two, or more Individuals</b>		
				<b>One</b>	<b>Two</b>	<b>≥Three</b>
1979	217,965	98,958	2.20	36.3	28.6	35.2
1989	243,886	119,705	2.04	41.7	27.7	30.6
2000	271,359	137,810	1.97	45.0	26.9	28.1
2007	292,895	153,322	1.91	47.2	26.7	26.0

---



---

**Panel D: Individuals per Household**


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	<b>Individuals (Thousands)</b>	<b>Households (Thousands)</b>	<b>Mean Individuals per Household</b>	<b>Percent of Households with one, two, or more Individuals</b>		
				<b>One</b>	<b>Two</b>	<b>≥Three</b>
1979	217,965	79,399	2.75	22.7	31.2	46.1
1989	243,886	93,626	2.60	24.8	32.2	43.0
2000	271,359	106,512	2.55	26.2	33.2	40.6
2007	292,895	116,881	2.51	27.6	33.2	39.3

---

**Table 3: Growth in median incomes using alternative income series****Panel A: Total median income growth in each business cycle**

	Tax unit Pre-tax Pre- transfer	Household Pre-tax Post- transfer	Household Size-adj. Pre-tax Post-transfer	Household Size-adj. Post-tax Post-transfer	Household Size-adj. Post-tax + Health Ins.
1979-1989	0.2%	6.6%	9.2%	12.0%	12.0% <sup>1</sup>
1989-2000	9.1%	9.3%	13.4%	14.4%	16.6%
2000-2007	-5.5%	-1.2%	-0.1%	1.0%	4.8%
1979-2007	3.2%	15.2%	23.6%	29.3%	36.7% <sup>1</sup>

**Panel B: Annualized median income growth in each business cycle**

	Tax unit Pre-tax Pre- transfer	Household Pre-tax Post- transfer	Household Size-adj. Pre-tax Post-transfer	Household Size-adj. Post-tax Post-transfer	Household Size-adj. Post-tax + Health Ins.
1979-1989	0.02%	0.66%	0.92%	1.20%	1.20% <sup>1</sup>
1989-2000	0.82%	0.85%	1.22%	1.31%	1.51%
2000-2007	-0.79%	-0.17%	-0.02%	0.14%	0.68%
1979-2007	0.12%	0.54%	0.84%	1.05%	1.31% <sup>1</sup>

Source: See Table 1.

Table 4: Quintile income growth by business cycle using each income series

Panel A: 1979-1989 business cycle income growth, by income quintile					
	Tax unit Pre-tax Pre-transfer	Household Pre-tax Post-transfer	Household Size-adj. Pre-tax Post-transfer	Household Size-adj. Post-tax Post-transfer	Household Size-adj. Post-tax Post-trans + Health Ins. <sup>1</sup>
Bottom quintile	-0.2%	5.0%	0.0%	0.4%	0.4%
2nd quintile	-5.0%	0.2%	-0.7%	1.0%	1.0%
Middle quintile	0.0%	6.3%	9.1%	11.7%	11.7%
4th quintile	4.0%	9.6%	12.9%	15.6%	15.6%
Top quintile	17.6%	19.7%	23.4%	28.1%	28.1%
Top 10%	21.8%	23.0%	19.7%	27.4%	33.7%
Top 5%	25.6%	26.3%	27.2%	32.0%	39.5%
1979 Gini	0.515	0.424	0.384	0.349	0.330
1989 Gini	0.547	0.451	0.423	0.394	0.372



---

**Panel B: 1989-2000 business cycle income growth, by income quintile**


---

	Tax unit Pre-tax Pre-transfer	Household Pre-tax Post-transfer	Household Size-adj. Pre-tax Post-transfer	Household Size-adj. Post-tax Post-transfer	Household Size-adj. Post-tax Post-trans + Health Ins.
Bottom quintile	17.8%	10.6%	17.2%	20.4%	23.2%
2nd quintile	10.8%	8.3%	12.6%	15.2%	18.2%
Middle quintile	7.5%	10.7%	13.1%	14.5%	16.8%
4th quintile	10.7%	12.3%	13.3%	13.8%	15.5%
Top quintile	14.7%	14.0%	16.2%	14.8%	15.5%
Top 10%	15.0%	14.3%	14.0%	17.0%	15.2%
Top 5%	14.4%	13.8%	13.9%	16.6%	15.1%
1989 Gini	0.547	0.451	0.423	0.394	0.372
2000 Gini	0.556	0.459	0.427	0.390	0.364

---

**Panel C: 2000-2007 business cycle income growth, by income quintile**


---

	Tax unit Pre-tax Pre-transfer	Household Pre-tax Post-transfer	Household Size-adj. Pre-tax Post-transfer	Household Size-adj. Post-tax Post-transfer	Household Size-adj. Post-tax Post-trans + Health Ins.
Bottom quintile	-43.0%	-5.8%	-6.2%	-4.8%	2.2%
2nd quintile	-10.2%	-3.9%	-2.9%	-1.2%	4.7%
Middle quintile	-4.9%	-2.0%	-0.4%	1.2%	4.9%
4th quintile	-2.5%	-0.1%	1.0%	2.3%	5.2%
Top quintile	-1.6%	-1.4%	-1.0%	1.5%	3.1%
Top 10%	-2.4%	-2.4%	-1.4%	-2.0%	1.3%
Top 5%	-4.0%	-4.0%	-4.0%	-3.4%	1.5%
2000 Gini	0.556	0.459	0.427	0.390	0.364
2007 Gini	0.566	0.462	0.430	0.396	0.362

**Panel D: 1979-2007 income growth, by income quintile**

	Tax unit Pre-tax Pre-transfer	Household Pre-tax Post-transfer	Household Size-adj. Pre-tax Post-transfer	Household Size-adj. Post-tax Post-transfer	Household Size-adj. Post-tax Post-trans + Health Ins.
Bottom quintile	-33.0%	9.5%	9.9%	15.0%	26.4%
2nd quintile	-5.5%	4.3%	8.6%	15.0%	25.0%
Middle quintile	2.2%	15.3%	22.8%	29.5%	36.9%
4th quintile	12.3%	23.0%	29.2%	34.6%	40.4%
Top quintile	32.7%	34.6%	42.0%	49.4%	52.6%
Top 10%	36.7%	37.3%	34.6%	46.1%	56.0%
Top 5%	37.9%	38.0%	39.1%	48.7%	63.0%
1979 Gini	0.515	0.424	0.384	0.349	0.330
2007 Gini	0.566	0.462	0.430	0.396	0.362

Source and Notes: See Table 1.

<sup>1</sup> Health insurance information not available prior to 1988. The rate of growth in the value of health insurance from 1979-1989 is assumed to match that of post-tax, post-transfer income.

**Table 5: Comparing the quintile distributions of the size-adjusted household income distribution and not size-adjusted tax unit income distribution (2007).**

		Quintile of not-size-adjusted Tax Unit income					Total
		Bottom	2nd	Middle	4th	Top	
Quintile of size-adj. Household income	Bottom	11.5	7.1	1.4	0.0	0.0	20
	2nd	3.5	6.8	7.9	1.9	0.0	20
	Middle	2.2	3.3	6.5	7.4	0.6	20
	4th	1.7	1.7	3.1	7.7	5.8	20
	Top	1.2	1.1	1.2	3.1	13.5	20
	Total	20	20	20	20	20	100

Source: See Table 1.

Note: In both series the unit of analysis is the individual so each quintile contains 20 percent of individuals in the population and income is measured using post-tax, post-transfer income including the ex-ante value of health insurance benefits.

**Table 6: Relative benefit of health insurance tax exclusion by quintile of the distribution in each income series in 2007 (Population mean benefit normed to 100 in each series)**

		relative Health Insurance Tax exclusion benefit			relative Health Insurance Tax exclusion benefit
Quintile of not size-adj. Tax Unit income	Bottom	1.17	Quintile of size- adj. Household income	Bottom	18.08
	2nd	25.55		2nd	79.27
	Middle	101.95		Middle	116.93
	4th	177.12		4th	144.85
	Top	194.22		Top	140.88

Source: See Table 1.

Note: In both series the unit of analysis is the individual so each quintile contains 20 percent of individuals in the population and income is measured using post-tax, post-transfer income including the ex-ante value of health insurance benefits.

**Table 7: Comparing relative benefits of health insurance tax exclusion by the joint quintile of the size-adjusted household income and not size-adjusted tax unit income distributions in 2007 (Population mean benefit normed to 100 in each series)**

		Quintile of (not size-adjusted) Tax Unit income					All
		Bottom	2nd	Middle	4th	Top	
Quintile of size-adjusted Household income	Bottom	HH: 3.2	HH: 31.1	HH: 76	HH: N/A	HH: N/A	HH: 18.1
		TU: 1	TU: 35.7	TU: 104.1	TU: N/A	TU: N/A	TU: 20.3
	2nd	HH: 25.5	HH: 31.7	HH: 124.5	HH: 162	HH: 119.8	HH: 79.3
		TU: 1.3	TU: 28.4	TU: 145.6	TU: 226.4	TU: 225.9	TU: 88.3
	Middle	HH: 63.1	HH: 21.7	HH: 107.4	HH: 181.5	HH: 154.8	HH: 116.9
		TU: 1.6	TU: 10.4	TU: 98.8	TU: 220.7	TU: 222.2	TU: 122
	4th	HH: 108.9	HH: 61.4	HH: 36.7	HH: 175.7	HH: 195.4	HH: 144.9
		TU: 1.6	TU: 11.8	TU: 28.7	TU: 170.1	TU: 239.9	TU: 141.4
	Top	HH: 128.7	HH: 84.1	HH: 53.1	HH: 74.1	HH: 169	HH: 140.9
		TU: 0.8	TU: 8.9	TU: 16.8	TU: 60.5	TU: 173.3	TU: 128
	All	HH: 27.1	HH: 62.2	HH: 113.2	HH: 144.6	HH: 153	
		TU: 1.2	TU: 25.6	TU: 101.9	TU: 177.1	TU: 194.2	

Source: See Table 1.

Note: HH is the ratio of the mean benefit to size-adjusted household income in the joint quintile to the mean benefit to size-adjusted household income for the population. TU is the ratio of the mean benefit to not-size-adjusted tax unit income in the joint quintile to the mean benefit to not-size-adjusted tax unit income for the population. In both series the unit of analysis is the individual so each quintile contains 20 percent of individuals in the population.

## Household incomes increased faster at the top

	Average annual change, in percentages		
	Total population	Bottom decile	Top decile
Australia	3.6	3.0	4.5
Austria	1.3	0.6	1.1
Belgium	1.1	1.7	1.2
Canada	1.1	0.9	1.6
Chile	1.7	2.4	1.2
Czech Republic	2.7	1.8	3.0
Denmark	1.0	0.7	1.5
Finland	1.7	1.2	2.5
France	1.2	1.6	1.3
Germany	0.9	0.1	1.6
Greece	2.1	3.4	1.8
Hungary	0.6	0.4	0.6
Ireland	3.6	3.9	2.5
Israel <sup>1</sup>	1.7	-1.1	2.4
Italy	0.8	0.2	1.1

Note: Income refers to disposable **household** income, corrected for household size and deflated by the consumer price index (CPI). Average annual changes are calculated over the period from 1985 to 2008, with a number of exceptions: 1983 was the earliest year for Austria, Belgium, and Sweden; 1984 for France, Italy, Mexico, and the United States; 1986 for Finland, Luxembourg, and Norway; 1987 for Ireland; 1988 for Greece; 1991 for Hungary; 1992 for the Czech Republic; and 1995 for Australia and Portugal. The latest year for Chile was 2009; for Denmark, Hungary, and Turkey it was 2007; and for Japan 2006. Changes exclude the years 2000 to 2004 for Austria, Belgium, Ireland, Portugal and Spain for which surveys were not comparable.

1. Information on data for Israel: <http://dx.doi.org/10.1787/888932315602>.

Source: OECD Database on Household Income Distribution and Poverty.

## Household incomes increased faster at the top

	Average annual change, in percentages		
	Total population	Bottom decile	Top decile
Japan	0.3	-0.5	0.3
Luxembourg	2.2	1.5	2.9
Mexico	1.4	0.8	1.7
Netherlands	1.4	0.5	1.6
New Zealand	1.5	1.1	2.5
Norway	2.3	1.4	2.7
Portugal	2.0	3.6	1.1
Spain	3.1	3.9	2.5
Sweden	1.8	0.4	2.4
Turkey	0.5	0.8	0.1
United Kingdom	2.1	0.9	2.5
United States	1.3	0.5	1.9
<b>OECD27</b>	<b>1.7</b>	<b>1.3</b>	<b>1.9</b>

Note: Income refers to disposable **household income**, corrected for household size and deflated by the consumer price index (CPI). Average annual changes are calculated over the period from 1985 to 2008, with a number of exceptions: 1983 was the earliest year for Austria, Belgium, and Sweden; 1984 for France, Italy, Mexico, and the United States; 1986 for Finland, Luxembourg, and Norway; 1987 for Ireland; 1988 for Greece; 1991 for Hungary; 1992 for the Czech Republic; and 1995 for Australia and Portugal. The latest year for Chile was 2009; for Denmark, Hungary, and Turkey it was 2007; and for Japan 2006. Changes exclude the years 2000 to 2004 for Austria, Belgium, Ireland, Portugal and Spain for which surveys were not comparable.

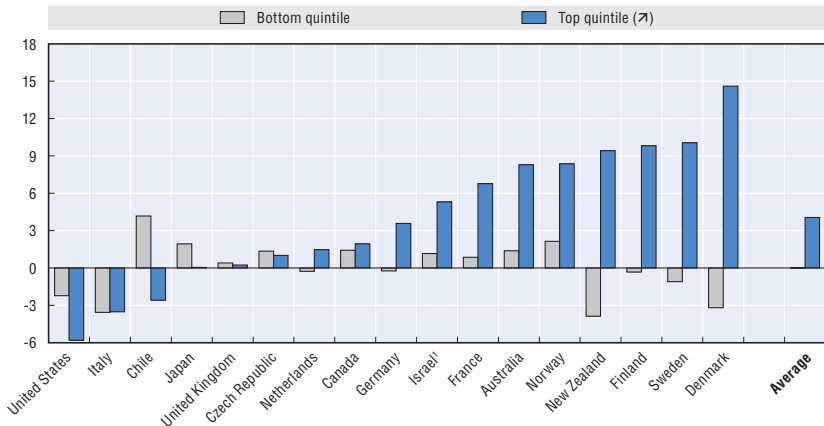
1. Information on data for Israel: <http://dx.doi.org/10.1787/888932315602>.

Source: OECD Database on Household Income Distribution and Poverty.



## Capital income became a greater source of **household** income, but mainly in rich households

Percentage-point changes in the shares of capital income in total household income, mid-1980s to late 2000s

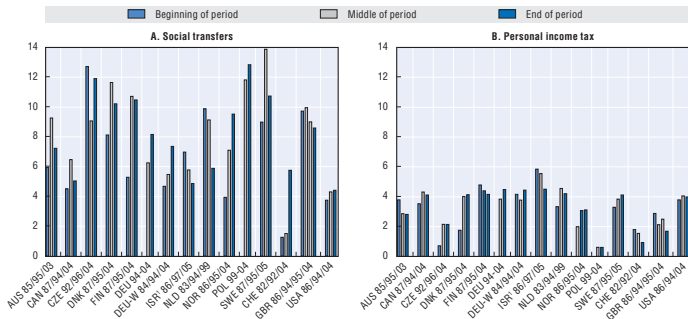


1. Information on data for Israel: <http://dx.doi.org/10.1787/888932315602>.

Source: Chapter 6, Table 6.2.

# While market income inequality rose, redistribution through tax/transfers became less effective in many countries

Changes in cash redistribution of social transfers, personal income taxes and social security contributions, mid-1980s to mid-2000s

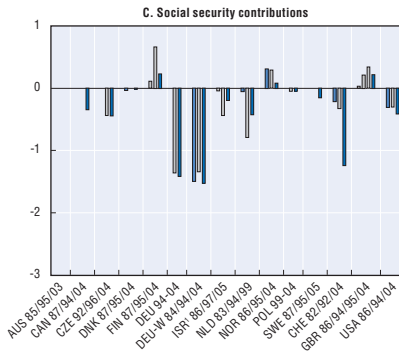


*Note:* Income refers to **individual** income. Redistribution is the difference between the Gini coefficients before and after the respective tax or benefit. Households headed by a working-age individual.

1. Information on data for Israel: <http://dx.doi.org/10.1787/888932315602>.

*Source:* Chapter 7, Figure 7.3.

While market income inequality rose, redistribution through tax/transfers became less effective in many countries

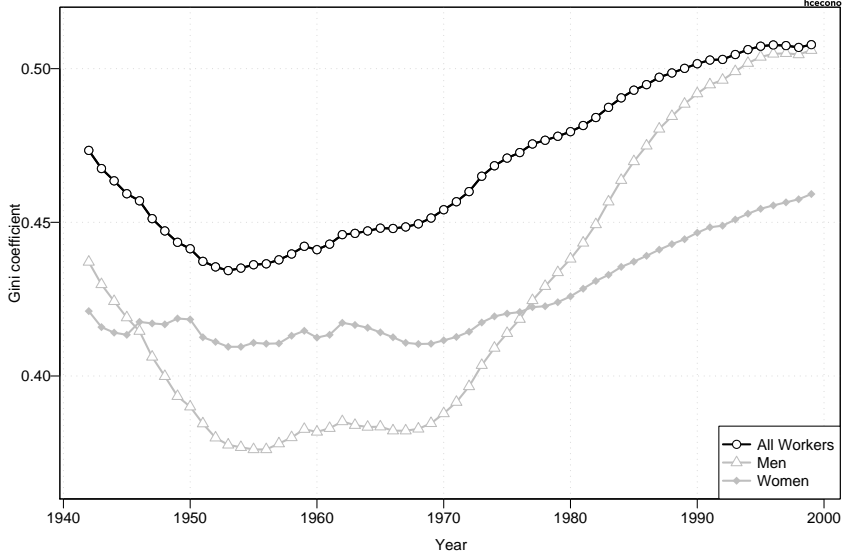


*Note:* Income refers to **individual** income. Redistribution is the difference between the Gini coefficients before and after the respective tax or benefit. Households headed by a working-age individual.

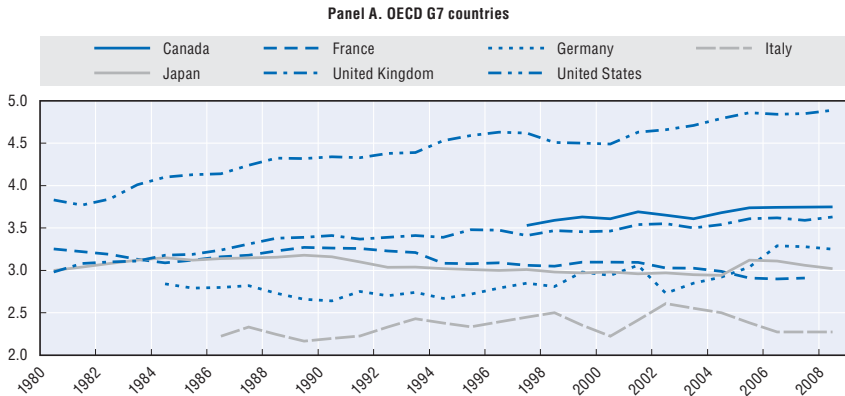
1. Information on data for Israel: <http://dx.doi.org/10.1787/888932315602>.

*Source:* Chapter 7, Figure 7.3.

Figure 7: Gini coefficient: 11 Year Average Earnings



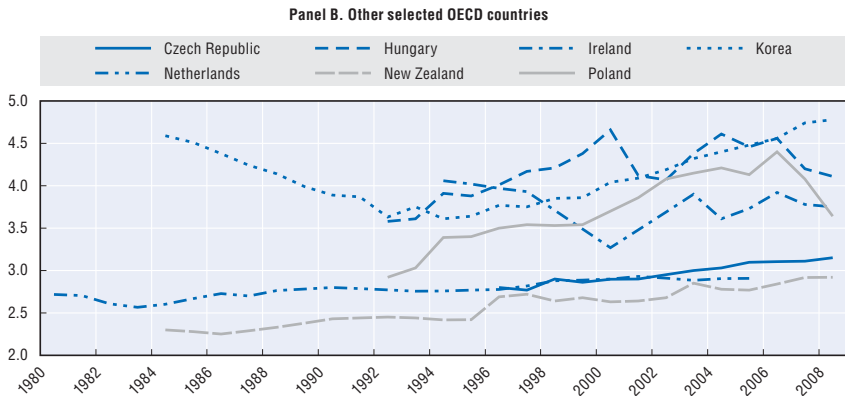
## Trends in wage dispersion, selected OECD countries, 1980-2008



*Note:* Data presented on the **individual** level. Wage dispersion: D9/D1 ratios of full-time earnings, i.e. the ratio of the wages of the 10% best-paid workers to those of the 10% least-paid workers, calculated as the ratio of the upper bound value of the 9th decile to the upper bound value of the 1st decile.

*Source:* OECD Earnings Database.

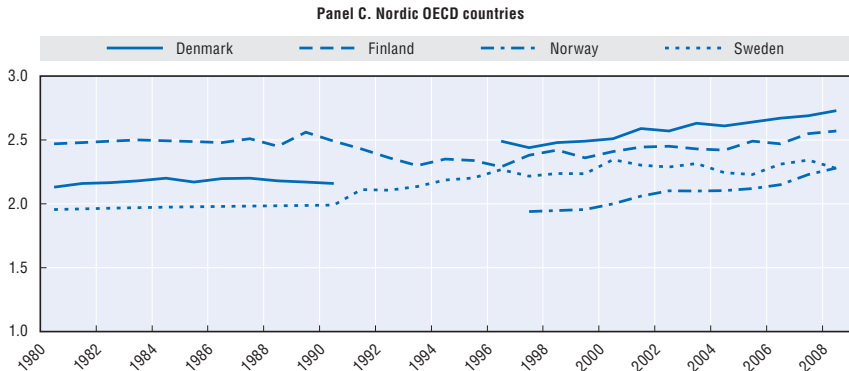
# Trends in wage dispersion, selected OECD countries, 1980-2008 (cont.)



*Note:* Data presented on the **individual** level. Wage dispersion: D9/D1 ratios of full-time earnings, i.e. the ratio of the wages of the 10% best-paid workers to those of the 10% least-paid workers, calculated as the ratio of the upper bound value of the 9th decile to the upper bound value of the 1st decile.

*Source:* OECD Earnings Database.

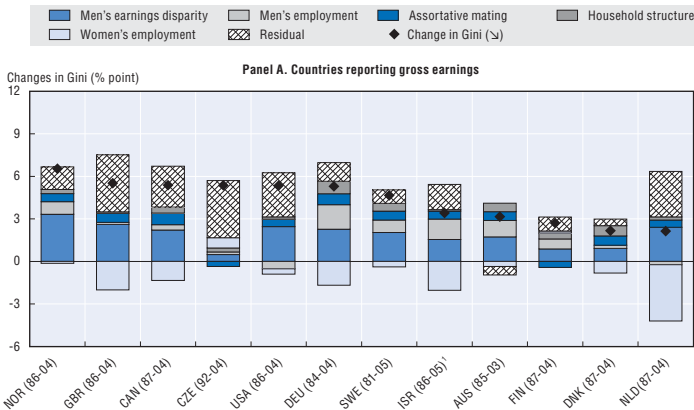
# Trends in wage dispersion, selected OECD countries, 1980-2008 (cont.)



*Note:* Data presented on the **individual** level. Wage dispersion: D9/D1 ratios of full-time earnings, i.e. the ratio of the wages of the 10% best-paid workers to those of the 10% least-paid workers, calculated as the ratio of the upper bound value of the 9th decile to the upper bound value of the 1st decile.

*Source:* OECD Earnings Database.

## Explaining changes in **household** earnings inequality: contributions of labour market and demographic factors



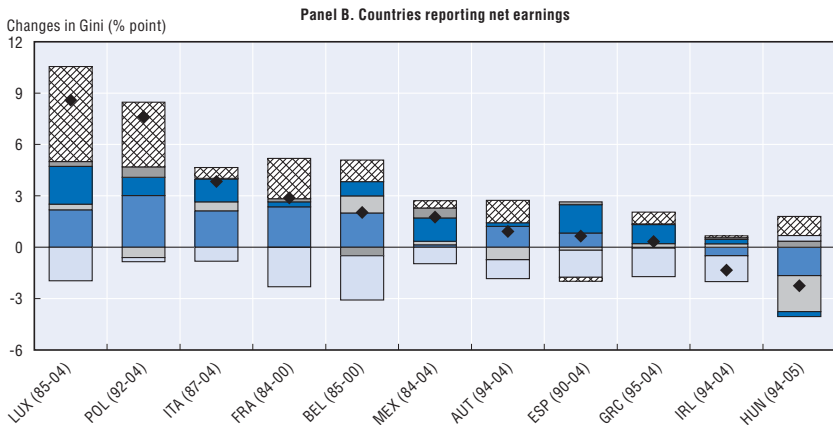
*Note:* Samples are restricted to the working-age population (25-64 years) living in a household with a working-age head. Equivalent household earnings are calculated as the sum of earnings from all household members, corrected for differences in household size with an equivalence scale (square root of household size).

1. Information on data for Israel: <http://dx.doi.org/10.1787/888932315602>.

*Source:* OECD Secretariat calculations from the Luxembourg Income Study (LIS).



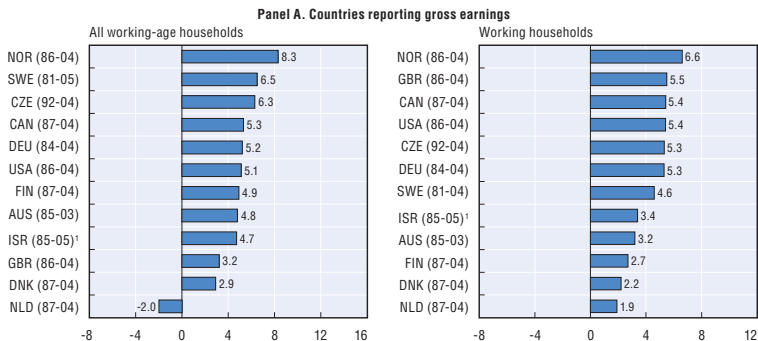
## Explaining changes in **household** earnings inequality: contributions of labour market and demographic factors



Note: Samples are restricted to the working-age population (25-64 years) living in a household with a working-age head. Equivalent household earnings are calculated as the sum of earnings from all household members, corrected for differences in household size with an equivalence scale (square root of household size).

1. Information on data for Israel: <http://dx.doi.org/10.1787/888932315602>.

# Evolution of equivalent household earnings inequality (Gini coefficient)

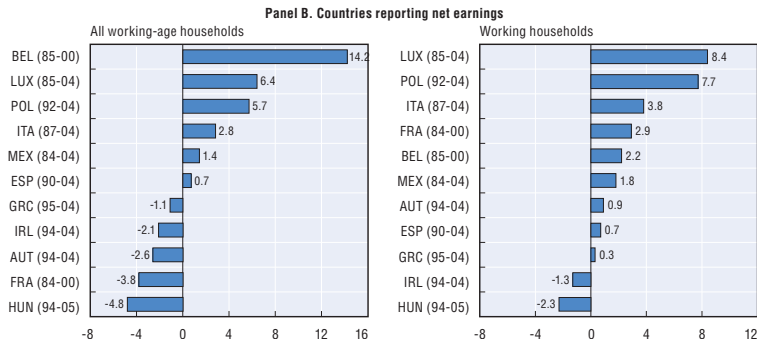


*Note:* Samples are restricted to the working-age population (25-64 years) living in a household with a working-age head. Equivalent household earnings are calculated as the sum of earnings from all household members (including elderly and young adults if they lived in a household with a working-age head), corrected for differences in household size with an equivalence scale (square root of household size).

1. Information on data for Israel: <http://dx.doi.org/10.1787/888932315602>.

*Source:* OECD Secretariat calculations from the Luxembourg Income Study (LIS).

## Evolution of equivalent household earnings inequality (Gini coefficient)



*Note:* Samples are restricted to the working-age population (25-64 years) living in a household with a working-age head. Equivalent household earnings are calculated as the sum of earnings from all household members (including elderly and young adults if they lived in a household with a working-age head), corrected for differences in household size with an equivalence scale (square root of household size).

1. Information on data for Israel: <http://dx.doi.org/10.1787/888932315602>.

*Source:* OECD Secretariat calculations from the Luxembourg Income Study (LIS).

## Attanasio, Hurst and Pistaferri (2012): CEX sample

Let

- $C_{it}$  be the total consumption of household  $i$  in period  $t$
- $C_{it} = \sum_{k=1}^K q_{it}^k$ , where  $q_{it}^k$  is the spending in category  $k$  ( $k = 1, \dots, K$ )

Suppose

- $q_{it}^1$  and  $q_{it}^2$  are two commodities that are known to be measured without systematic error. [It is not clear why this is the case. The authors did not test for alternative pairs of goods] **[Assumption 1]**
- $q_{it}^1$  a luxury and  $q_{it}^2$  a necessity
- can be expressed in terms of Engel curves **[Assumption 2]**

$$\begin{aligned} q_{it}^1 &= C_{it}^{\alpha_1} u_{it}^1 v_t^1, & \alpha_1 &> 1 \\ q_{it}^2 &= C_{it}^{\alpha_2} u_{it}^2 v_t^2, & \alpha_2 &< 1 \end{aligned}$$

where  $\alpha_1$  and  $\alpha_2$  are income elasticities,  $v_t^1$  and  $v_t^2$  are aggregate factors (e.g. relative prices), and  $u_{it}^1$  and  $u_{it}^2$  are unobserved idiosyncratic taste shocks.

Attanasio, Hurst and Pistaferri (2012)

Taking the logs of the ratio between  $q_{it}^1$  and  $q_{it}^2$  yields

$$\log\left(\frac{q_{it}^1}{q_{it}^2}\right) = (\alpha_1 - \alpha_2) \log(C_{it}) + \log\left(\frac{v_t^1}{v_t^2}\right) + \log\left(\frac{u_{it}^1}{u_{it}^2}\right)$$

Then the cross-sectional variance is given

$$\begin{aligned} \text{Var}\left(\log\left(\frac{q_{it}^1}{q_{it}^2}\right)\right) &= (\alpha_1 - \alpha_2)^2 \text{Var}(\log(C_{it})) + \text{Var}\left(\log\left(\frac{u_{it}^1}{u_{it}^2}\right)\right) \\ &\quad + 2(\alpha_1 - \alpha_2) \text{Cov}\left(\log(C_{it}), \log\left(\frac{u_{it}^1}{u_{it}^2}\right)\right) \end{aligned}$$

By assuming that the idiosyncratic taste shocks are uncorrelated [**Assumption 3**], simplifies to

$$\text{Var}\left(\log\left(\frac{q_{it}^1}{q_{it}^2}\right)\right) = (\alpha_1 - \alpha_2)^2 \text{Var}(\log(C_{it})) + \text{Var}\left(\log\left(\frac{u_{it}^1}{u_{it}^2}\right)\right)$$

Attanasio, Hurst and Pistaferri (2012)

We can get the variance of total consumption as

$$\text{Var}(\log(C_{it})) = \frac{1}{(\alpha_1 - \alpha_2)^2} \left[ \text{Var} \left( \log \left( \frac{q_{it}^1}{q_{it}^2} \right) \right) - \text{Var} \left( \log \left( \frac{u_{it}^1}{u_{it}^2} \right) \right) \right]$$

If we are willing to assume that the variance of taste shocks is invariant over time **[Assumption 4]**, then changes (for example, between time  $t$  and time  $j$ ) in the variance of log consumption can be computed as:

$$\text{Var}(\log(C_{it})) - \text{Var}(\log(C_{ij})) = \frac{1}{(\alpha_1 - \alpha_2)^2} \left[ \text{Var} \left( \log \left( \frac{q_{it}^1}{q_{it}^2} \right) \right) - \text{Var} \left( \log \left( \frac{q_{ij}^1}{q_{ij}^2} \right) \right) \right]$$

where the proportionality factor  $\frac{1}{(\alpha_1 - \alpha_2)^2}$  is taken from the literature.

## Attanasio, Hurst and Pistaferri (2012)

The previous procedure was applied to spending on entertainment services ( $q_{it}^1$ ) and expenditure on food at home ( $q_{it}^2$ ).

Why?

- One good has elasticity greater than 1 and the other good lower than 1 (This ensures that the proportionality factor is well defined. Nevertheless, one just need that  $|\alpha_1 - \alpha_2| > 0$  )
- Components relatively well measured (according to evidence on Meyer and Sullivan, 2012)

## Attanasio, Hurst and Pistaferri (2012): PSID sample

Main problem with PSID:

- Until 1997, it only includes measures of food consumption (food at home, away from home, and the value of food stamps). After 1997, broader measures are collected, covering around 70% of total CEX spending:
  - Includes spending on utilities (electricity, heating, water, miscellaneous utilities), home insurance premiums, health (health insurance premiums, nursing care, doctor visits, prescriptions, other health spending), vehicle spending (vehicle insurance premiums, vehicle repairs, gasoline, parking), transportation (bus fares, taxi fares, other transportation expenses), education (tuition, other school expenses), and child care.

To create a measure of total consumption, the authors used imputation methods:

- Ziliak (1998)
  - Consumption is defined as the difference between income and the changes in assets (sum of liquid assets and equity, where the difference between the self-reported home value and the remaining principal on the home mortgage).



## Attanasio, Hurst and Pistaferri (2012)

- Blundell, Pistaferri and Preston (2008)
1. Estimate a food demand equation using CEX data

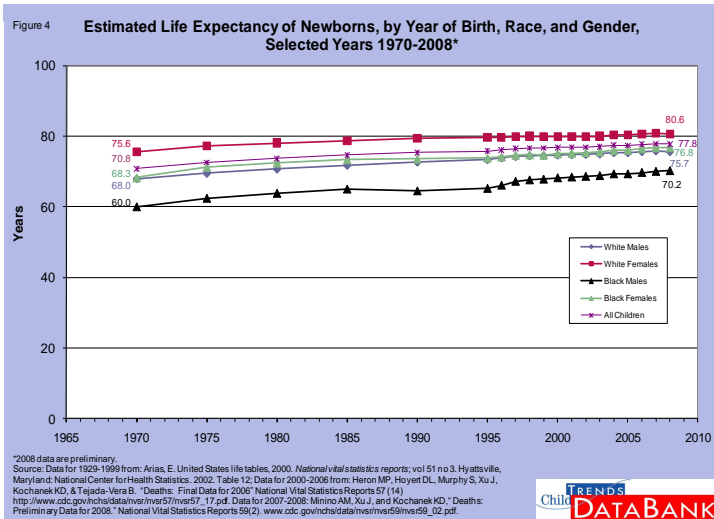
$$\ln food_{it}^{CEX} = X_{it}^{CEX} \beta_t + \ln C_{it}^{CEX} \gamma_t(E_{it}^{CEX}) + \varepsilon_{it}^{CEX}$$

where  $X_{it}$  includes number of children, a quadratic in the household head's age, a dummy for self-employment, education dummies;  $\ln C_{it} \gamma_t(E_{it})$  includes log consumption and the interaction between log consumption and education; and  $\varepsilon_{it}$  is an idiosyncratic taste preference shifter.

2. Using  $\widehat{\beta}_t^{CEX}$  and  $\widehat{\gamma}_t^{CEX}$ , one can get a measure of consumption with PSID data by computing

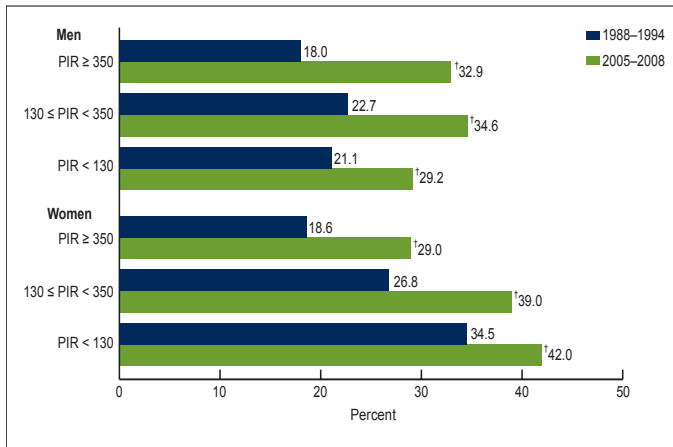
$$\ln \widehat{C}_{it}^{PSID} = \frac{\ln food_{it}^{PSID} - X_{it}^{PSID} \widehat{\beta}_t^{CEX}}{\widehat{\gamma}_t^{CEX}(E_{it}^{PSID})}$$

# Life Expectancy by Race - U.S.



# Obesity

Figure 4. Prevalence of obesity among adults aged 20 years and over, by poverty income ratio and sex: United States, 1988–1994 and 2005–2008



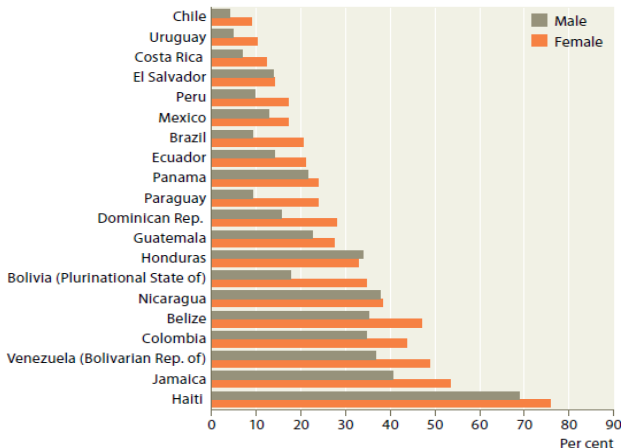
†Significant increase.

NOTE: PIR is poverty income ratio.

SOURCES: CDC/NCHS, National Health and Nutrition Examination Survey, 1988–1994 and 2005–2008.

## Poverty Rates

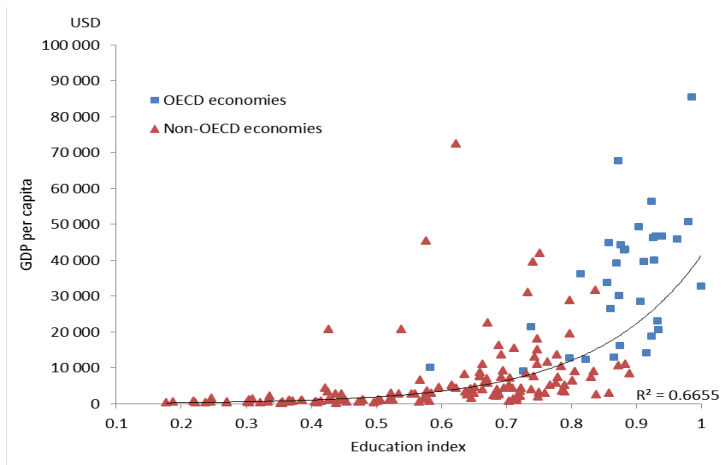
### Poverty rate of Lone Parents with Children, Latin America and the Caribbean, 1999–2008 (latest available)



Source: CEDLAS and The World Bank, Socio-Economic Database for Latin America and the Caribbean (SEDLAC) (2009).  
 Note: Poverty rates are based on \$2.50 a day poverty line.

# Education

## Education Index and GDP per Capita, 2010

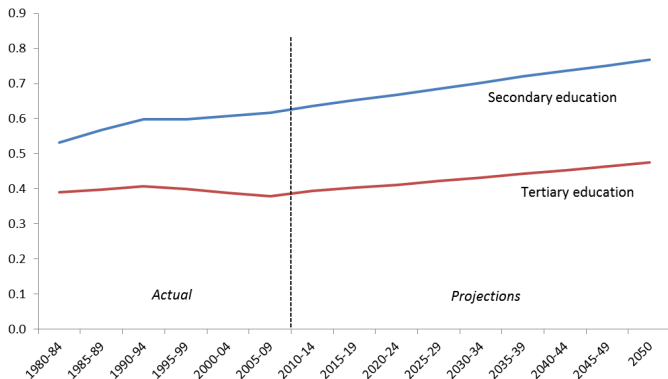


Source: Perspectives on Global Development 2013

Notes: The education index is measured by the adult literacy rate (with two-thirds weighting) and the combined primary, secondary and tertiary gross enrolment ratio (with one-third weighting).

# Education

**Ratios between Education Levels in non-OECD and OECD Countries, 1980-2050**

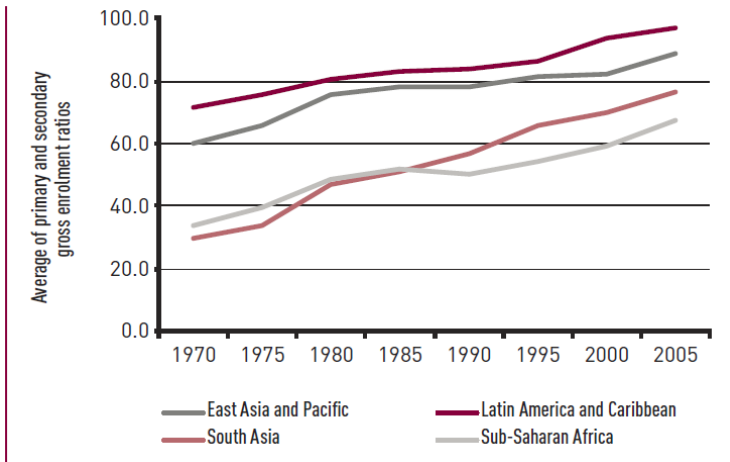


Source: Perspectives on Global Development 2013

Notes: Notes: OECD countries are the 34 members of the organization in 2012. The ratios of secondary and tertiary education measure the average enrolment rate in non-OECD countries against the average enrolment rate in OECD countries.

# Education

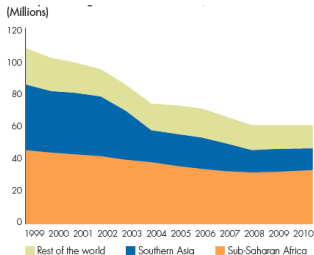
## Combined primary and secondary enrolment by region, 1970–2005



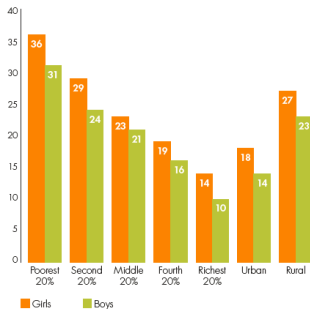
Source: United Nations, 2010

# Education

**Primary school age children out of school, 1999-2010**



**Percentage of lower secondary-age children out of school by household wealth, 2005/2010**

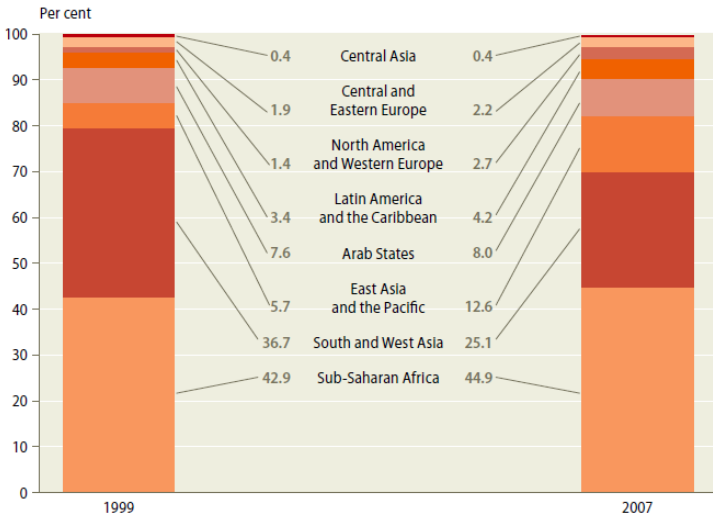


Source: United Nations, The Millennium Development Goals Report, 2012



## Education

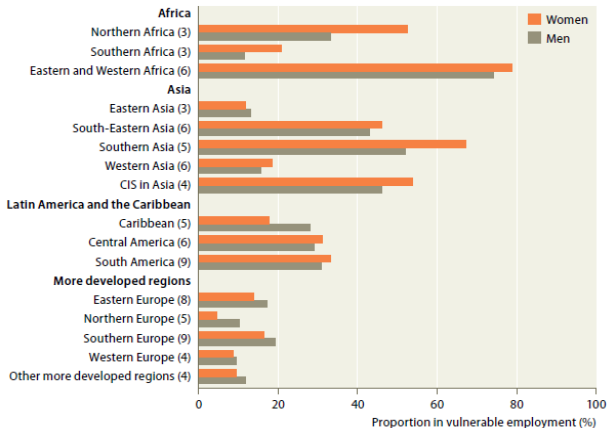
### Geographic distribution of primary school age children out of school



Source: The World's Women 2010, United Nations

## Participation in the Labor Market

### Employed persons in vulnerable employment by region and sex, 2004-2007



Source: Computed by the United Nations Statistics Division based on data from ILO, Key Indicators of the Labour Market, 5th edition, table 3 (accessed in July 2009).

Note: Unweighted averages; the numbers in brackets indicate the number of countries averaged. The average for Eastern Asia does not include China. Western Asia excludes Armenia, Azerbaijan and Georgia; CIS in Asia includes the aforementioned countries plus Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan.

# Participation in the Labor Market

## Adult (15+) Unemployment Rate by Region and Sex

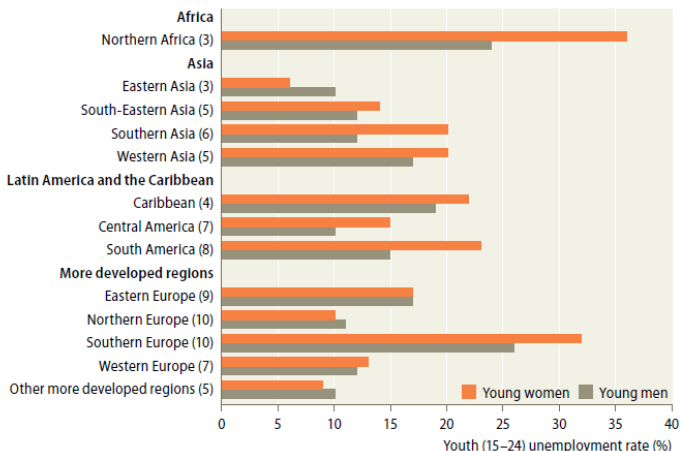
	Adult female unemployment rate (%)			Adult male unemployment rate (%)			Female-male differential (percentage points)		
	1990	2000	2007	1990	2000	2007	1990	2000	2007
<b>Africa</b>									
Northern Africa (3)	20	17	17	11	11	10	9	6	7
<b>Asia</b>									
Eastern Asia (3)	2	4	3	2	6	4	0	-2	-1
South-Eastern Asia (4)	4	6	6	4	6	5	0	0	1
<b>Latin America and the Caribbean</b>									
Caribbean (8)	20	16	14	13	10	8	7	6	6
Central America (6)	9	10	7	7	7	5	2	3	2
South America (7)	9	14	10	7	10	6	2	4	4
<b>More developed regions</b>									
Eastern Europe (9)	..	12	8	..	12	7	..	0	1
Northern Europe (8)	6	5	5	6	5	4	0	0	1
Southern Europe (4)	15	14	10	7	7	6	8	7	4
Western Europe (7)	7	6	6	4	4	5	3	2	1
Other more developed regions (5)	6	5	4	6	6	4	0	-1	0

Source: Computed by the United Nations Statistics Division based on data from ILO, Key Indicators of the Labour Market, 5th edition, table 8a (accessed in June 2009).

Note: Unweighted averages; the numbers in brackets indicate the number of countries averaged. The average for Eastern Asia does not include China.

# Participation in the Labor Market

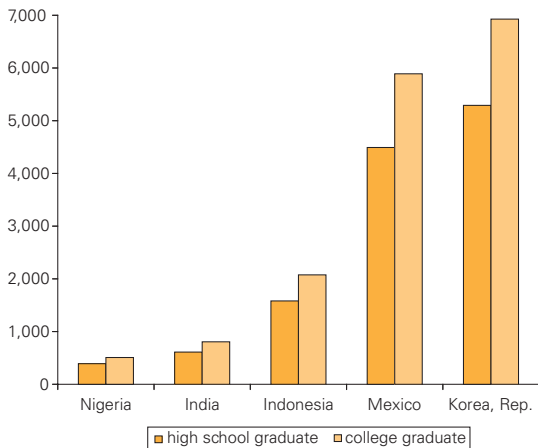
## Youth (aged 15–24) Unemployment Rate by Region and Sex, 2007



Source: Computed by the United Nations Statistics Division based on data from ILO, Key Indicators of the Labour Market, 5th edition, table 9 (accessed in July 2009).

Note: Unweighted averages; the numbers in brackets indicate the number of countries averaged. The average for Eastern Asia does not include China. Western Asia excludes Armenia, Azerbaijan and Georgia.

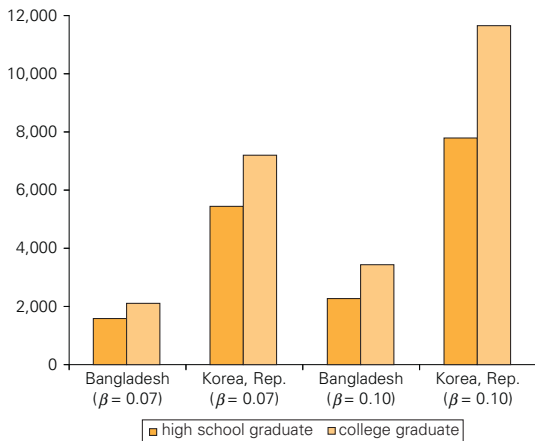
## Predicted Annual Earnings (PPP-Adjusted) of High School and College Graduates Based on NISP Skill Prices, across Selected Countries ( $r=0.07$ )



Source:

Note: New Immigrant Survey Pilot.

## Predicted 1996 Earnings (PPP-Adjusted) Based on NISP Skill Prices by Schooling Level and Schooling Return, Bangladesh and Republic of Korea



Source:

Note: New Immigrant Survey Pilot.

## Effects of Home Country Skill Price, GDP, and Distance on Log of Number and Average Schooling Attainment of U.S. Employment Visa Principal Immigrants in 2003

	Log number of employment visa principal immigrants	Log average schooling of employment visa principal immigrants
Log skill price (NIS, 2003)	-0.827 (1.23) <sup>a</sup>	0.499 (2.83)
Log GDP per adult equivalent	0.604 (2.74)	-0.108 (1.60)
Log distance of country to the United States	-0.248 (4.98)	0.0377 (4.43)
R-squared	0.611	0.112
Number of sending countries	168	94

Source: New Immigrant Survey.

Note: The specification also includes whether there is a military base in the home country, the log of the home country labor force size, and measures of the quality of primary and secondary schools.

<sup>a</sup> Absolute values of bootstrapped t-ratios in parentheses are based on the multiple imputation method.

## Effects of Home Country Skill Price, GDP, and Distance on Log of Number and Exit Rate of Foreign University Students in United States, 2004

Dependent variable	Log number of U.S. foreign students		Log exit rate of foreign students	
	NISP	OWW	NISP	OWW
Log skill price	-0.259 (2.17) <sup>a</sup>	-0.730 (2.14) <sup>a</sup>	0.0152 (2.31)	0.0193 (3.61)
Log GDP per adult equivalent	0.516 (2.85)	1.06 (2.71)	0.00145 (0.56)	-0.00137 (0.42)
Log distance of country to United States	-0.298 (4.30)	-0.309 (4.44)	0.00163 (0.52)	0.00237 (0.75)
R-squared	0.766	0.766	0.183	0.202
Number of sending countries	125	125	125	125

Source: New Immigrant Survey.

Note: The specification also includes the log of the home country population and measures of the number and quality of home country universities. NISP = New Immigrant Survey Pilot; OWW = Occupational Wages Around the World.

<sup>a</sup> Absolute values of bootstrapped t-ratios in parentheses are based on the multiple imputation method.



## Endogenous income

### Endogenizing the income process

- Distinguish inequality from choices and inequality from randomness.
- Human capital investments (school, on the job):
  - Ben-Porath type models: investigate the technology of human capital accumulation.
  - Introduce general equilibrium effects (Heckman, Lochner, Taber 1998).
  - Distinguish types learning: “by-doing” vs “on-the-job training” (Heckman, Lochner, Cossa 2003).
  - Returns to schooling, returns to experience, returns to tenure.
  - Investigate the interaction of investments in human capital and financial markets.

## Endogenizing the income process

- Matching, search and labor market frictions:
  - Macro: search as a way to analyze equilibrium unemployment.
  - Micro: search as a way to study wage dynamics over the life-cycle.
  - Quantify the role of frictions.
  - Investigate complementarities in production and sorting.
  - On-the-job search as motive for life-cycle wage growth.

## Endogenizing the income process

- Building bridges:
  - Initial search: gain experience, look for a good match to settle in (Mincer and Jovanovic 1981).
  - Match specific workers' learning as function of the quality of the firm:
    1. alters the pattern of sorting (introduce possible non-monotonicity);
    2. induce mobility independent of frictions;
    3. induce wage growth independent of frictions.
  - Relate consumption choices with endogenous income processes.

## Consider the Individual's Problem: Simple Deterministic Case

$$\underbrace{Y}_{\text{Income}} = \underbrace{W'}_{\text{Payment per unit labor supply}} \underbrace{H}_{\text{Labor supply}} + \underbrace{r'}_{\text{Average return on physical assets}} \underbrace{A}_{\text{Physical assets}}$$

$$\underbrace{S}_{\text{savings}} = Y - \underbrace{C}_{\text{consumption}}$$

Wealth at age  $t$   $A(t)$ : integral of savings and initial endowments.

For the case of a scalar asset and a deterministic interest rate:

$$A(t) = \int_0^t e^{r\tau} S(\tau) d\tau + A(0)$$

## Relating income and consumption processes

- Aggregate analyses are useful to analyze overall trends.
- But miss individual dynamics of income and consumption choices over the life-cycle.
- Study how income fluctuations translate into consumption choices:
  1. analyze the nature of the income process;
  2. investigate individual preferences over sequences of consumption and the attitude toward risk and ambiguity;
  3. understand the role of informational and market constraints;
  4. endogeneize income through human capital investments and labor supply decisions.

## Income processes

## Modeling an exogenous income process

- A statistical exercise: income as an exogenous flow.
- Key features regarding shocks to income:
  1. permanent vs transitory;
  2. anticipated vs unanticipated;
  3. insurable vs uninsurable.
- A general framework to analyze 1 (Meghir and Pistaferri 2011):

$$\ln Y_{i,a,t}^e = d_t^e + \beta^e X_{i,a,t} + u_{i,a,t}$$

$$u_{i,a,t} = \underbrace{a \times f_i}_{\text{Individual life-cycle trend}} + \underbrace{\nu_{i,a,t}}_{\text{Transitory process}} + \underbrace{p_{i,a,t} + m_{i,a,t}}_{\text{Permanent process}} \quad (1)$$

$$; \quad \nu_{i,a,t} = \Theta_q(L)\epsilon_{i,a,t} \quad ; \quad P_p(L)p_{i,a,t} = \zeta_{i,a,t}$$

## Modeling an exogenous income process

- One of the most used specification (MaCurdy 1982, Abowd and Card 1989) restricts 1 to:

$$\ln Y_{i,a,t}^e = d_t^e + \beta^e X_{i,a,t} + u_{i,a,t}$$

$$u_{i,a,t} = a \times f_i + \nu_{i,a,t} + p_{i,a,t} + m_{i,a,t} \quad (2)$$

$$\nu_{i,a,t} = \epsilon_{i,a,t} - \theta \epsilon_{i,a-1,t-1} ; p_{i,a,t} = p_{i,a-1,t-1} + \zeta_{i,a,t} ; p_{i,0,t-a} = h_i$$

- taking differences:

$$g_{i,a,t} = \Delta u_{i,a,t} = f_i + \Delta m_{i,a,t} + (1 + \theta L) \Delta \epsilon_{i,a,t} + \zeta_{i,a,t} \quad (3)$$

## Modeling an exogenous income process

- The most debated modeling specifications regard:
  1. Random walk vs AR(1) for the permanent component.
  2. Heterogeneous growth profiles ( $f_i \neq 0$ ) or not.
    - ⇒ Guvenen (2009): with short panels (PSID) a model with AR(1) and heterogeneous profiles can't be distinguished from a random walk.
    - ⇒ Baker & Solon (2003): on Canada, evidence of random walk and heterogeneous profiles. Hause (1980) heterogeneous profiles in Sweden.
    - ⇒ Hryshko (2009): on PSID, strong evidence of a random walk, weak of heterogeneous income profiles.



## Modeling an exogenous income process

3. Many alternative specifications in the literature.
  - ⇒ Gottschalk & Moffitt (1995): PSID, increase in cross-sectional variance due to transitory (1/2) and permanent (1/2). Transitory dominates in second half of 80s (but weird transitory specification).
  - ⇒ Browning, Alvarez, Ejrnaes (2006): PSID, mixture of unit root and stable AR: most people do not have a unit root.

## Modeling an exogenous income process

- Cannot evaluate which shocks are anticipated or insurable with income data only.
- The ideal data would include: consumption, assets, measurements of individual ability, expectations.
- Need to distinguish learning from heterogeneous income profiles.
- Need to evaluate information sets and insurability.

## Choosing (only) consumption Consumption choices with an exogenous income

- A standard model:

$$\max_{c_{t=0}^{t=T}} \mathbb{E}_a \left[ \sum_{j=0}^{A-a} \beta^j U(c_{i,a+j,t+j}) \mid Z_{i,a+j,t+j}; \mathcal{I}_{i,a,t} \right]$$

$$\text{s.t. } B_{i,a+j+1,t+j+1} = (1+r)(B_{i,a+j,t+j} + Y_{i,a+j,t+j} - C_{i,a+j,t+j})$$

$$B_{i,A} = 0$$

and  $y_t$  follows a process as analyzed before.

- Evaluate how much income risk is reflected in utility costs.
- Evaluate *ex ante* vs *ex post* uncertainty.

## Consumption choices with an exogenous income

- Friedman (PIH) uses quadratic utility, income has a transitory and permanent component:
  - Anticipated changes in income do not affect consumption.
  - Consumption responds 1-to-1 to permanent shocks, response to transitory depends on the time horizon.

## Consumption choices with an exogenous income

- Blundell, Pistaferri, Preston (2008), Meghir and Pistaferri (2004) use CRRA utility and random walk plus MA(1) for the income process.
- Log-linearize FOC to obtain:

$$\Delta c_{i,a,t} = \delta_{i,a,t} + \overbrace{\Xi_{i,a,t}}^{\text{insurance vs perm.}} \zeta_{i,a,t} + \overbrace{\pi_a \Xi_{i,a,t}}^{\text{insurance vs trans.}} \epsilon_{i,a,t}$$

$$\text{where } \Xi_{i,a,t} = \frac{\sum_{j=0}^{A-a} \frac{Y_{i,a+j,t+j}}{(1+r)^j}}{\sum_{j=0}^{A-a} \frac{Y_{i,a+j,t+j}}{(1+r)^j} + B_{i,a,t}}$$

and  $\pi_a =$  annuitization factor

- Precautionary motive for savings (as in Carroll 2001)
- Young individuals: low assets compared to future income ( $\Xi_{i,a,t} \approx 1$ )  $\Rightarrow$  only transitory shocks are smoothed through savings.

## Consumption choices with an exogenous income

- Evidence on PSID data suggests that:
  - Partial insurances against permanent shocks 0.65 (on non-durables)
  - Partial insurances against transitory shocks 0.05 (on non-durables)
  - Including durables for low wealth HH: 1, 0.37
    - ⇒ durables used as smoothing mechanism.
  - College educated more insured:
    - ⇒ better access to markets? different preferences?
  - No evidence of private information from the agent,
    - ⇒ but the covariance test used has low power.

## Consumption choices with an exogenous income

- Possible issues:
  - Estimation is conditional on the approximation which introduces bias.
  - There is no appropriate treatment of heterogeneity or potential learning about oneself.
  - Human capital is taken as given (no investments).
  - There is no attempt to evaluate financial frictions (borrowing limits...).
  - Generalizing preferences might change findings: allow for ambiguity aversion and more flexible time and risk preferences.
  - Cunha and Heckman (2007) find evidence of private information, but uncertainty increased in recent years especially for the less skilled.
  - There is no labor (income) / leisure trade off.

## Sources of bias in the price deflator

### (a) Quality bias

Inadequate adjustments for the quality improvements in products over time.

### (b) Substitution bias

A fixed market basket does not account for the fact that people substitute away from high relative price items.

### (c) Outlet bias

Movement of purchases toward low-price discount or big-box stores like Walmart.

### (d) New product bias

Omission or long delay in the incorporation of new products into the CPI basket.



## Do price deflators rise unequally?

### **Why is it important to look at measurement error of price indices when studying inequality?**

Using CPI or PCE implicit price deflator, may yield a distorted picture of changes in living standards for groups whose consumption baskets are different from the “aggregate” bundles used in the deflators. An increase in the aggregate price level associated with an increase in the price of necessities relative to luxuries, for example, will increase the level of “true poverty” compared with the same aggregate price increase associated with a relative increase in the price of luxuries.

### **Should the price adjustment vary by income level?**

The standard consumption inequality literature uses a single price index. Nevertheless, there is some evidence that points to slower price increases for the bottom of the income distribution. We will develop this further.

## How different are the most used deflators?

- Often median and mean income per household and per person are deflated by the Census using the CPI-U and CPI-U-RS price index (“U” Stands for urban, “RS” stands for research series). The CPI-U-RS corrects many of the sources of upward bias present in the standard CPI-U price index.
- The CPI-U-RS increases over 1979–2007 at an annual rate of 3.50 percent, 0.25 points slower than the conventional CPI-U. The difference vis--vis the PCE and GDP are even larger:

Deflator	1979–2007	1979–1995	1995–2000	2000–2007	
CPI-U-RS	3.5	4.24	2.3	2.65	Recreated
PCE	3.27	4.16	1.76	2.32	
GDP	3.15	3.87	1.64	2.58	

from Gordon (2008)

## Literature on the deflator bias

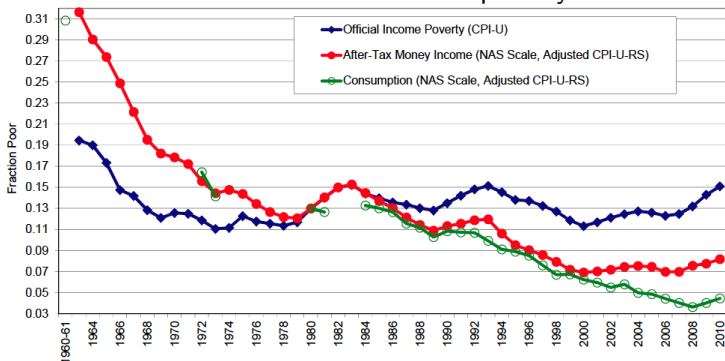
- Boskin commission (Boskin et al. 1996)
  - Group of economist appointed by the Senate Finance Commission concluded that the annual bias in the CPI-U was 1.1–1.3 percentage points per year in the 1980s and 1990s.
- Hausman and Leibtag (2003)
  - Shows that the arrival of a Walmart store in a community reduces consumer prices for food by 25 percent, of which 20 percent is the direct Walmart impact and the other 5 percent represents the response of local stores to the Walmart arrival.
  - What should be Walmart impact on inequality?
    - There is no quantitative evidence on the magnitude of this effect on inequality. But notice that both because low-income households shop at Walmart, and because they spend a larger proportion of their household income on food than high-income households, there should be significant reduction in their cost of living. The CPI ignores this effect.

- Hobijn and Lagakos (2005)
  - Study differences across households to see if there are systematic relationships between inflation rates and household characteristics. No effect is found. There may be some problems with their approach:
    - depends on official CPI data, which is subject to the outlet substitution bias (e.g. Walmart prices as a measured decline in the price level),
    - focuses on deviations in household inflation rates over three-month intervals rather than the long-run (more suited for the study of consumption inequality).
- Gordon (2006)
  - Recent changes in the methodology of CPS-U and CPS-U-RS continue to present a bias of 0.8 percentage points per year.
- Meyer and Sullivan (2011, 2012)
  - Construct income series correcting for biases in price deflator: substitution bias, outlet bias, quality bias and new-product bias.
  - Concludes that the increase in inequality and poverty rates may be over estimated.

Meyer and Sullivan (2011, 2012)

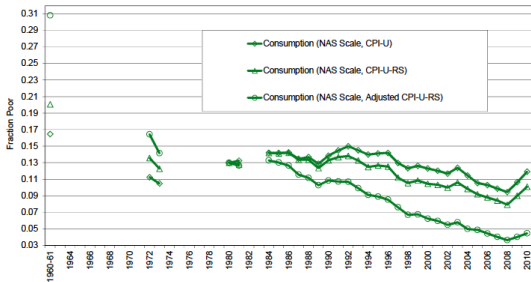
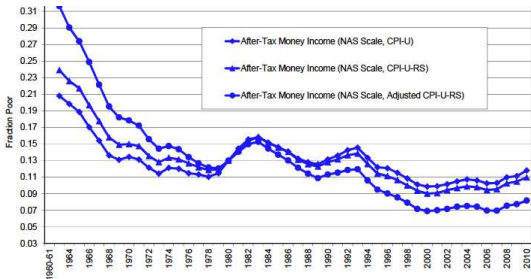
The impact of the deflator can be very large

## Official and alternative income poverty rates



Notes: Data are from the CPS-ASEC/ADF and CEX. Official Income Poverty follows the U.S. Census definition of income poverty using official thresholds. For measures other than the official one, the threshold in 1980 is equal to the value that yields a poverty rate equal to the official poverty rate in 1980 (13.0 percent). The thresholds in 1980 are then adjusted over time using the adjusted CPI-U-RS, which subtracts 1.1 percentage points from the CPI-U-RS each year from 1960-1977 and 0.8 percentage points from the CPI-U-RS each year from 1978-2010. Poverty status is determined at the family level and then person weighted. After-Tax Money Income includes taxes and credits (calculated using TAXSIM). CE data are not available for the year 1962-1971, 1974-1979, 1982-1983.

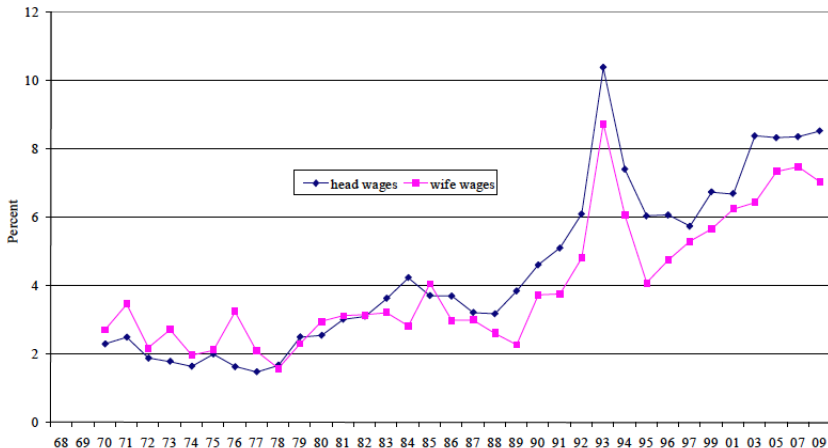
## Meyer and Sullivan (2011, 2012)



# Evidence on Nonresponse and Under-reporting

## Nonresponse is increasing over time in most surveys

### Non-response rate for wages (PSID)

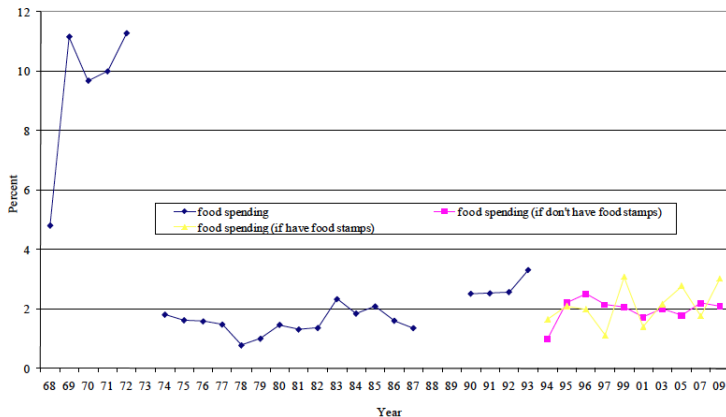


Recreated from PSID-Technical Series Paper #11-02



## Nonresponse patterns change with modifications in the questions

### Non-response rate for spending on food consumed at home (PSID)



Recreated from PSID-Technical Series Paper #11-02

## Who are the nonreporters?

Lillard, Smith and Welch (1986) compare earnings (self-reported and imputed) and found that relation between earnings and the probability of not reporting is U-shaped-hitting its trough between \$16,000 and \$19,000.

Proportion of Nonresponse white men by earnings interval  
(CPS, 1980)

<b>Income interval</b>	<b>Earnings</b>	<i>Earnings only</i>	<i>Any other items</i>
1,000–2,999	18.2	8.4	8.4
3,000–5,999	17.1	7.9	9.2
6,000–11,999	15.7	7.6	8.1
12,000–24,999	14.9	8.3	6.6
25,000–34,999	17.2	9.9	7.3
35,000–39,999	19.6	12.5	7.1
40,000–49,999	23.7	15.1	8.6
Over 50,000	26.0	18.1	7.9

Reproduced from Lillard, Smith and Welch (1986)

## Who are the nonreporters?

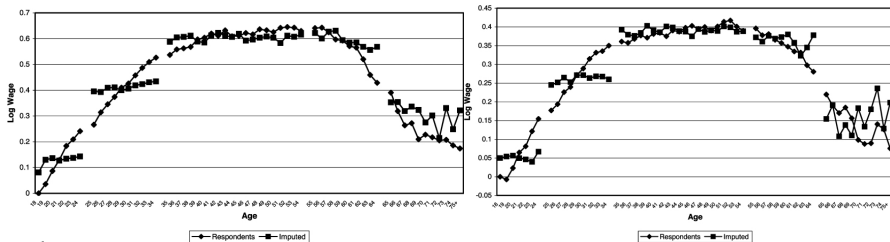
Non-response rates to average wage calculation from 1980–2000 Census, 5% sample

		1980	1990	2000
<b>Women</b>	white	0.047	0.155	0.249
	black	0.095	0.239	0.359
	Hispanic	0.061	0.175	0.267
	Asian	0.062	0.160	0.229
	Native American	0.077	0.175	0.249
<b>Men</b>	white	0.070	0.177	0.286
	black	0.131	0.295	0.404
	Hispanic	0.090	0.229	0.344
	Asian	0.091	0.184	0.261
	Native American	0.105	0.215	0.290

Source: IPUMS 5% sample.

## Imputation methods can create bias

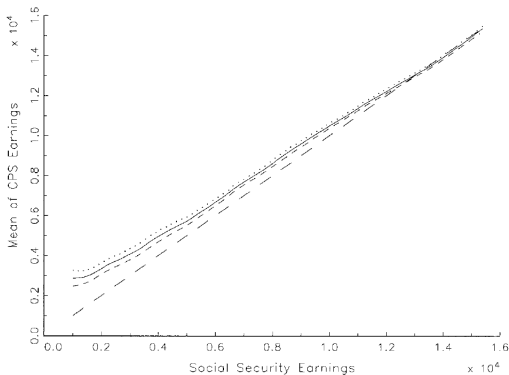
Male and female wage-age profiles (left and right, respectively)



Reproduced from Bollinger and Hirsch (2006). Estimates are from a pooled wage equation of respondents and imputed earners using the CPS-ORG for 1998–2002. The male sample size is 388,578 (276,909 respondents and 111,669 imputed). The female sample size is 369,762 (270,537 respondents and 99,225 imputed). The sample includes all nonstudent wage and salary workers, ages 18 and over. Shown are log wage differentials at each age relative to earnings of respondents who are age 18. In addition to the education dummies, control variables include race-ethnicity (four dummy variables for five categories), foreign born, labor market size, region, and year.

## Over- and Under-reporting

Bollinger (1998) utilizes an exact match file between the 1978 March CPS and administrative records from the SSA to analyze errors in the reporting of annual income using nonparametric methodology. Their finding point to higher measurement error in cross-sectional samples than in panels and a negative relationship between measurement error. This last results is driven largely by overreporting among male low earners.



Reproduced from Bollinger (1998). Sample of males. Income in ten thousands of dollars. The continuous line represents

## Literature

### **For a general literature review on income measurement error:**

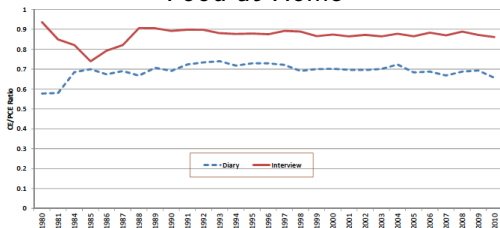
- Bound, Brown, and Mathiowitz (2001)
  - Surveys several studies and concludes that measurement error is mean reverting in several datasets (e.g. CPS, PSID), in the sense that persons with low earnings tend to overstate their earnings and persons with high earnings tend to understate their earnings.

### **How are the inequality measures affected by measurement error?**

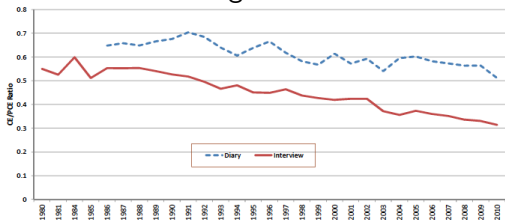
- Gottschalk and Huynh (2010)
  - Shows how non-classical measurement error affects some summary measures of inequality and mobility.

# Comparisons of CEX Diary and CEX interview to PCE Aggregates

## Food at Home



## Clothing and Shoes



Reproduced from Bee, Meyer and Sullivan (2012)

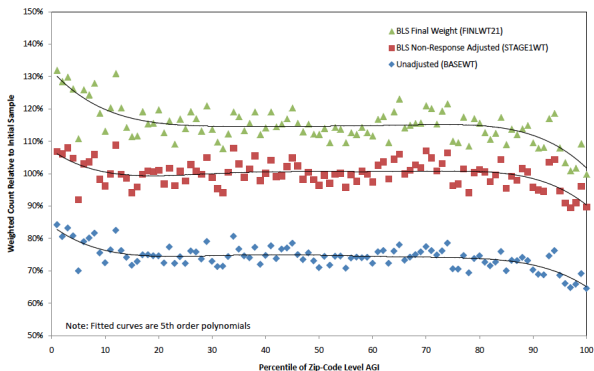
## Fraction of consumer units with zero spending by some spending categories

PCE category	2010			1991			1986		
	DS	IS	DS-IS	DS	IS	DS-IS	DS	IS	DS-IS
Household appliances	0.961	0.816	0.146	0.968	0.799	0.169	0.971	0.783	0.189
Food	0.189	0.012	0.177	0.090	0.008	0.082	0.117	0.009	0.108
Clothing materials	0.983	0.972	0.011	0.963	0.916	0.047	0.966	0.901	0.065
Rent and utilities	0.720	0.024	0.696	0.629	0.028	0.601	0.708	0.034	0.673
Child care	0.990	0.974	0.016	0.966	0.942	0.024	0.953	0.931	0.022
Mean difference			0.133			0.161			0.169
Median difference			0.065			0.110			0.120

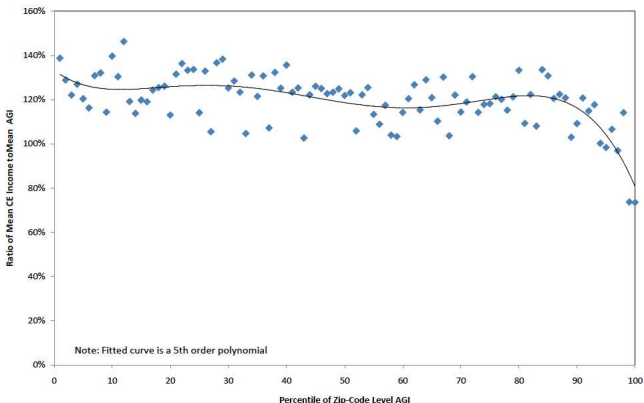
For more categories see Table 6 in Bee, Meyer and Sullivan (2012)



Sabelhaus et al. (2012) develops a new approach to disentangle between those two explanations. They link the average Adjusted Gross Income (AGI) by zip-code to the CEX sampled households (both respondents and non-respondents). The figure shows that households in the top AGI percentile zip-codes are 10 percent less likely to participate than the rest of the sample.



Moreover, households within the top AGI percentiles that do participate are more likely to have lower incomes than the households in that zip-code who did not participate.



The main conclusion of Sabelhaus et al. (2012) is that under-reporting in high households is likely to explain why CEX does not capture as much income as other surveys.

## The authors use March CPS data:

- Supplemented with cell-means to overcome topcoding of high incomes (Larrimore et al. 2008).
- Adjusted for inflation to 2008 dollars using the CPI-U-RS.
- To overcome the fact that CPS does not directly inquire about tax credits, tax liabilities, or about the value of in-kind compensation (such as employer or government provided health insurance), they impute this information for each individual using NBER TaxSim 9.0.
- To overcome the fact that CPS does not accounts for ex-ante value of in-kind health insurance benefits, the authors imputs cell means of employer contributions from the Medical Expenditure Panel Survey Insurance Component (MEPSIC).

## Measures of income:

1. Pre-tax, pre-transfer (market) income: includes income from wages and salaries, self-employment, farm income, interest, dividends, rents, trusts, and retirement pension income but excludes public transfers which are not included in market income.
2. Pre-tax, post-transfer income: Adds cash transfers to the income measure used in the previous series. This includes income from welfare transfer programs such as AFDC/TANF as well as from social insurance programs such as Social Security and Workers' Compensation. It excludes, however, transfers directly tied to the tax system such as the Earned Income Tax Credit. It also excludes any in-kind government transfers, such as the value of Medicare or Medicaid insurance.

## Measures of income:

3. Post-tax, post-transfer income: incorporates tax credits and liabilities.
4. Post-tax, post-transfer income plus health insurance: includes ex-ante value of employer provided health insurance and ex-ante value of government provided health insurance via Medicaid and Medicare.

## Two units are considered:

- Tax unit sharing unit. Under some assumptions they “transform” the observations of households into tax units. Account for the fact that not all Americans file a tax return, by considering both filing and non-filing tax units. According to Auten and Gee’s (2009), 91 percent of adults age 25–64 file a tax return.
- Household sharing unit, i.e. all individuals living in the same household are assumed to share economic resources.

**Table 1: Comparing the total growth from 1979-2007 using each sharing unit, size-adjustment, and income series combination.**

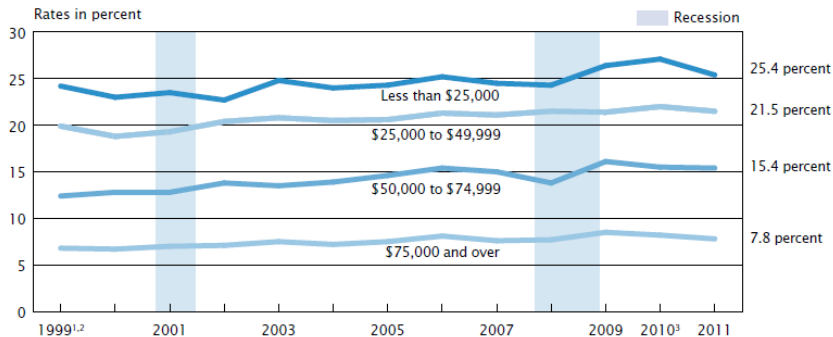
	Tax Unit	Household	Size-Adjusted Tax Unit	Size-Adjusted Household
Pre-tax, pre-transfer	3.2%	12.5%	14.5%	20.6%
Pre-tax, post-transfer	6.0%	15.2%	17.0%	23.6%
Post-tax, post-transfer	9.5%	20.2%	25.0%	29.3%
Post-tax, post-transfer + Health Insurance	18.2%	27.3%	33.0%	36.7%

Source: Public Use March CPS data.

Note: Changes in income between 1992 and 1993 are suppressed and assumed to be zero given the trend-break resulting from the CPS redesign in those years. See main text for details.

<sup>1</sup> Health insurance information not available prior to 1988. The rate of growth in the value of health insurance from 1979-1989 is assumed to match that of post-tax, post-transfer income.

## Uninsured Rate by Real Household Income: 1999 to 2011



<sup>1</sup> Implementation of Census 2000-based population controls occurred for the 2000 ASEC, which collected data for 1999. These estimates also reflect the results of follow-up verification questions, which were asked of people who responded "no" to all questions about specific types of health insurance coverage in order to verify whether they were actually uninsured. This change increased the number and percentage of people covered by health insurance, bringing the CPS more in line with estimates from other national surveys.

<sup>2</sup> The data for 1999 through 2009 were revised to reflect the results of enhancements to the editing process.

<sup>3</sup> Implementation of 2010 Census population controls.

Notes: Income in 2011 dollars. Respondents were not asked detailed health insurance questions before the 1988 CPS. The data points are placed at the midpoints of the respective years. For information on recessions, see Appendix A.

Source: U.S. Census Bureau, Current Population Survey, 2000 to 2012 Annual Social and Economic Supplements.



# Participation in the Labor Market

## Distribution of employed persons by status in employment, by region and sex, 2004–2007

	Women				Men			
	Wage and salaried workers (%)	Employers (%)	Own-account workers (%)	Contributing family workers (%)	Wage and salaried workers (%)	Employers (%)	Own-account workers (%)	Contributing family workers (%)
<b>Africa</b>								
Northern Africa (3)	46	2	19	34	58	8	22	11
Southern Africa (3)	76	3	17	4	82	7	9	2
Eastern and Western Africa (6)	20	1	47	32	24	1	56	18
<b>Asia</b>								
Eastern Asia (3)	86	2	7	5	80	7	13	<1
South-Eastern Asia (6)	52	2	23	23	52	4	34	9
Southern Asia (5)	30	1	22	46	44	3	40	12
Western Asia (6)	80	1	6	12	79	5	13	2
CIS in Asia (4)	45	1	39	15	50	3	39	7
<b>Latin America and the Caribbean</b>								
Caribbean (5)	80	2	16	2	67	3	27	1
Central America (6)	64	3	25	7	64	6	24	6
South America (9)	62	3	28	6	62	6	28	3
<b>More developed regions</b>								
Eastern Europe (8)	84	2	10	4	78	4	16	1
Northern Europe (5)	93	2	4	1	84	5	10	<1
Southern Europe (9)	81	3	10	6	74	6	17	2
Western Europe (4)	89	3	6	3	84	7	8	1
Other more developed regions (4)	88	2	7	2	83	5	11	1

Source: Computed by the United Nations Statistics Division based on data from ILO, Key Indicators of the Labour Market, 5th edition, table 3 (accessed in July 2009).

Note: Unweighted averages; the numbers in brackets indicate the number of countries averaged. Due to rounding, the sum of categories might not equal 100. The average for Eastern Asia does not include China. Western Asia excludes Armenia, Azerbaijan and Georgia; CIS in Asia includes the aforementioned countries plus Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan.

# Health

## Life Expectancy at Birth by Region and Sex

	Women			Men		
	1990–1995	2000–2005	2005–2010	1990–1995	2000–2005	2005–2010
<b>Africa</b>						
Northern Africa	68	72	73	64	68	69
Southern Africa	64	51	52	59	49	51
Eastern, Middle and Western Africa	54	55	57	50	52	54
<b>Asia</b>						
Eastern Asia	74	76	77	69	71	72
South-Eastern Asia	66	70	72	62	66	67
Southern Asia	59	65	67	57	62	64
Central Asia	68	70	70	61	61	62
Western Asia	72	75	76	67	71	72
<b>Latin America and the Caribbean</b>						
Caribbean	75	76	77	69	71	72
Central America	73	76	77	67	70	71
South America	72	75	76	66	69	70
Oceania	68	71	73	64	67	68
<b>More developed regions</b>						
Eastern Europe	75	76	77	66	68	69
Western Europe	80	82	83	74	76	78
Other more developed regions	80	83	83	74	77	78

Source: Computed by the United Nations Statistics Division based on data from United Nations, *World Population Prospects: The 2008 Revision* (2009)